

June 14, 2005

The President's Advisory Panel on Federal Tax Reform
1440 New York Avenue NW
Suite 2100
Washington, DC 20220

Dear Advisory Panel:

This submission contains general comments to the President's Advisory Panel on Federal Tax Reform.

On June 3, 2005, the Brookings Institution, the Urban-Brookings Tax Policy Center, and the World Resources Institute convened a symposium, "Tax Reform and the Environment," to identify and discuss reforms to the tax code that would be both fiscally prudent and environmentally sound. Panelists discussed a range of options including:

- Eliminating tax expenditures with adverse environmental impacts;
- Shifting more of the tax burden onto activities such as pollution and resource waste that make the economy unproductive and that reduce quality of life; and
- Using pollution charges to finance "revenue-neutral" tax reforms such as corporate tax integration.

Please find attached the panelists' working papers on these topics and supporting materials. Views expressed in the papers are those of the respective authors.

We thank you in advance for your consideration. Please contact us if you require additional information.

Sincerely,

William Gale
Deputy Director and Senior Fellow, Economic
Studies
Co-director, Urban-Brookings Tax Policy Center
The Brookings Institution
(202) 797-6148

David Sandalow
Director, Environment and Energy Project
The Brookings Institution
(202) 797-6056

Gilbert Metcalf
Chair, Department of Economics
Tufts University
(617) 627-3685

Craig Hanson
Senior Associate
World Resources Institute
(202) 729-7624

Steve Ellis
Vice President of Programs
Taxpayers for Common Sense
(202) 546-8500 x126

Attachments

- A. "Tax Reform and the Environment: Why and How" by Craig Hanson, Senior Associate, World Resources Institute.
- B. "Removing Fiscally and Environmentally Detrimental Tax Expenditures" by Steve Ellis, Vice President, Taxpayers for Common Sense.
- C. "Shifting Taxation from Income and Capital toward Pollution" by Gilbert Metcalf, Chair, Department of Economics, Tufts University.
- D. "Questions and Answers" transcript from "Tax Reform and the Environment" symposium, June 3, 2005, Washington, DC.
- E. "Environmental Taxes to Finance Capital Tax Reform," Kevin Hassett, Resident Scholar and Director of Economic Policy Studies, American Enterprise Institute, and Gilbert Metcalf, Chair, Department of Economics, Tufts University, 2001.



TAX REFORM AND THE ENVIRONMENT: WHY AND HOW?

Working paper

Craig Hanson
Senior Associate
World Resources Institute
chanson@wri.org
(202) 729-7624

“Taxes” and “the environment” are two concepts that typically are not uttered in the same sentence. Current events, however, may encourage us to more readily link them together over the coming years. The Bush Administration recently called for federal tax reform and the country is facing persistent budget deficits. In addition, the nation continues to encounter a number of environmental challenges including urban smog, water pollution, and climate change. This paper outlines four observations suggesting changes to the tax code that can help address all three of these issues; changes that improve not only *fiscal responsibility* but also *environmental quality*.

1. Taxes and the environment: A two way street

The first observation is that there *is* a relationship between the federal tax code and the environment, *and* it’s a two way street. Tax policies impact many of the decisions that individuals and businesses make such as how much to work, spend, and save; where to start a new business; and when to make business investments. Often unrecognized, however, is the fact that tax policy *also* can influence how much we consume, how we use our natural resources, and how much pollution is released into our air and water.

Some tax policies have intended, positive impacts on the environment and human health. For example, since 1989 excise levies on ozone-depleting chemicals have played a role in reducing the production and use of chlorofluorocarbons.¹ Others have unintended, negative environmental effects. For instance, farmers who irrigate in the Great Plains get a tax deduction for extracting groundwater in volumes that *exceed* what is naturally replenished each year.² Thus farmers are receiving a tax break for being inefficient and for depleting a national asset, our aquifers.

Moreover, not only can fiscal policies impact environmental health, but also environmental policies can impact fiscal health. This refers to the fact that policies such as environmental

levies can raise revenue. This is an important consideration as the Administration tackles fiscal policy issues such federal deficit reduction and tax reform.

Consider for a moment the budget deficit. It reached a record \$412 billion last year and many analysts expect that large deficits will continue, especially as baby boomers retire and collect Social Security and Medicare benefits.³ Some observers have concluded that spending restraint alone will be insufficient to solve this problem.⁴ Just six weeks ago, in fact, Federal Reserve Chairman Alan Greenspan stated that he expects new revenue measures to be part of any eventual agreement to reduce the deficit.⁵ Environmental levies could be one such revenue measure.

Alternatively, consider the President's tax reform initiative. Some reform proposals being suggested include provisions to further shield savings and investment from taxation and to eliminate the AMT.⁶ Since the President has stipulated that any reform must be "revenue neutral," there will be a need for a suite of counterbalancing revenue enhancements. Some of the environmental fiscal measures outlined below could be part of such a package.

2. Eliminating tax expenditures with adverse environmental impacts

One action that policymakers could take to meet tax reform or deficit reduction goals is to eliminate a number of existing tax expenditures that are both fiscally and environmentally damaging. "Tax expenditures" are tax exemptions, deductions, loopholes, and so on. In other words, *subsidies* provided through the tax system. Most notable among these are provisions for mature industries such as oil, mining, timber, and automobiles. The tax code, for example, gives independent oil and gas producers as well as hard-rock mining companies income tax deductions reflecting the depletion of the non-renewable resources they extract.

This "percentage depletion allowance" works against common sense notions of free markets, innovation, environmental protection, and fiscal responsibility. For instance, although this provision may have made sense 90 years ago when originally implemented,⁷ it doesn't now. These industries are clearly mature and should be governed by the free market. This subsidy also inhibits development of more efficient technologies and discourages recycling, which can be more efficient for aluminum and certain plastic resins relative to using virgin stock. By rewarding extractive activities beyond what is warranted by market demand, the provision encourages additional environmental damages such as groundwater contamination that we later have to clean up. And if *that's* not enough, the American public is paying for all of this, to the tune of nearly \$4 billion over the next five years.⁸ There are many other similar provisions that could be eliminated and thereby simplify and improve the tax code.⁹

Some may argue that it is nearly impossible to eliminate tax expenditures such as these. It is difficult; behind every tax preference there is a powerful constituency. But such reform has been done before. Last October, for instance, Congress was able to significantly reduce the size of the infamous "SUV tax loophole".

3. Introducing pollution charges

The third observation is that an additional opportunity for tax reform in a manner that improves not only fiscal responsibility but also environmental quality is to utilize pollution taxes or

charges.¹⁰ Political debates about taxes usually deal with the question of *how much* to tax. An equally important issue, however, is *what* to tax. Our taxes currently fall primarily on activities that make the economy productive: Work, savings, and investment. Such taxes can discourage people from pursuing these important activities. A better system would place more of the tax burden on activities that make the economy unproductive and that reduce our quality of life; activities such as pollution and resource waste.¹¹ In other words, things that society *wants* to discourage.

One way to do this is through pollution charges. These are fees on the amount of pollution that a firm or product releases into the air, water, or soil.¹² They are a means of tackling “market failures” that arise when businesses and consumers are not confronted with the full health and environmental costs associated with their activities. If designed appropriately, a charge can address market failures by providing price signals that more accurately reflect these costs. Quite fairly, they make polluters pay for their damages and incorporate these costs into their decisions and product prices.

By affecting behavior through prices, pollution charges harness market forces to improve efficiency and environmental quality. Thus they can have several advantages relative to more traditional environmental policies that mandate polluters to cut emissions by exactly the same amount or with the same emission control technology.¹³ For instance:

- Pollution charges encourage *cost-effective* emission reductions; companies that can cut back at little cost will while those facing higher costs will cut back less.
- They are *flexible*, allowing firms to make their *own* decisions on how to reduce emissions.
- They can stimulate *continuous technological innovation* for better pollution-control methods and cleaner inputs.
- In addition, pollution charges *generate revenue* that can be used to meet other objectives.¹⁴

Pollution charges are not new; they are being used in many OECD countries and several U.S. states.¹⁵ Even China is using charges to address some of its environmental problems such as water pollution.¹⁶

When should pollution charges be used? Economists generally agree that they are an appropriate policy instrument for dealing with certain, but not all, types of environmental problems.¹⁷ For instance:

- They are effective at addressing pollution caused by a large number of different sources, so many sources that permit trading or direct regulations would be difficult to administer.
- They are well suited for situations where emission reduction costs differ significantly between polluters, such that a “one-size-fits-all” policy would be inefficient.
- They are effective at addressing environmental problems where there is no single technical fix.
- Likewise, they are appropriate when the environmental problem is *not* in danger of reaching a catastrophic threshold in the near future. This is because charges do not guarantee a ceiling on the amount of pollution released, just on the cost of pollution control.
- From an implementation perspective, they are appropriate when emissions or the products associated with emissions are relatively easy to measure or monitor.

Given these conditions, which pollution charges could make sense nationwide? The following are a few examples:

Nitrogen fertilizer charge

One option is a pollution charge on fertilizers to address the growing problem of nutrient overloading in our waterways and coasts. The appearance of “dead zones” in places such as the Gulf of Mexico and the Chesapeake Bay has recently made headlines. Dead zones are vast regions of oxygen-depleted waters in which bottom-dwelling organisms die and fish are driven away. These zones damage shrimp, crab, and oyster communities as well as other industries such as commercial and sport fishing.

Dead zones are triggered by nutrient pollution, especially nitrogen, often from agricultural sources. Experts estimate that half the nitrogen overload in the Gulf of Mexico, for instance, comes from agricultural fertilizers and soil nitrogen from farmland in the Mississippi River basin.¹⁸ A big part of the problem is that American farmers waste a lot of fertilizer. According to the National Academy of Sciences, approximately 20% of nitrogen applied to fields is not used by crops; instead, much ends up in lakes and coastal waterways via run-off and drainage.¹⁹

A nitrogen fertilizer charge, easily administered at the point of purchase, could help address this issue. It would create an incentive for farmers to eliminate inefficient fertilizer use yet still allow them to maintain yields.²⁰ Furthermore, it meets the criteria discussed above and may be one of the few practical approaches for tackling this issue given the large number of pollution sources. Modeling conducted by the World Resources Institute indicates that a charge incentivizing a 10% decrease in fertilizer usage could generate over \$3 billion per year.²¹

Carbon levy

A second pollution charge to consider is a levy on the carbon content of fossil fuels. The levy would be proportional to the amount of carbon dioxide that is released when coal, oil, and natural gas are burned for energy. A carbon levy would be a good, market-based first step for addressing the challenge of man-made climate change. In order to give individuals and businesses time to adjust, it could be phased in gradually and then the market could figure out the most efficient solutions.²²

How much would this raise? Assume a price range of 5-25 U.S. dollars per metric ton of carbon.²³ The low end of this range reflects prices currently on the Chicago Climate Exchange²⁴ while the high end reflects the “cost cap” suggested by the National Commission on Energy Policy.²⁵ In terms of consumer prices, this translates into just 1-6 cents per gallon of gasoline.²⁶ Such a carbon levy would yield between about 8 and 38 billion dollars per year given current fossil fuel consumption levels.²⁷

Energy-related levies have been politically controversial in this country. But new challenges call for new ways of thinking. For example, prior to becoming Chairman of the President’s Council of Economic Advisors, Gregory Mankiw argued in favor of increasing the gasoline tax to finance tax reform.²⁸ This spring, editors of the news magazine *The Economist* recommended levies on energy as a means of addressing America’s energy security issues.²⁹ Duke Energy, one the country’s largest electric utilities, publicly announced in April its support for a carbon levy.³⁰

Furthermore, since January of this year, Americans have been living with what is essentially a 30 to 40 cent per gallon levy on gasoline, yet the country have outsourced the tax collection function to OPEC. Thus Americans receive absolutely no benefits: No revenue for deficit reduction, for assistance to low income households, or for technology R&D.

Other candidates

There are other candidates to consider, as well. For instance, pollution charges could be applied to airborne mercury emissions from industrial sources besides utilities.³¹ The U.S. also could utilize user fees³² for public lands and natural resources to a greater extent than we do today.

One area requiring further research is the broader consumption tax. Some proposals being made to the Advisory Panel on Tax Reform include value added taxes or a national sales tax. There are mixed views on what implications a VAT would have for the environment. Does resource consumption decline due to higher consumer prices? Or do other factors lead to increased pollution? Little research to address such questions has been recently conducted.

4. Incorporating into tax reform or deficit reduction packages

Introducing new pollution charges in the U.S. would be a challenge in today's political climate. But this leads to the fourth and final observation, which is that initiatives to reform the tax code and to reduce budget deficits actually provide a timely opportunity for considering such charges. In both contexts, policymakers will have to make difficult tradeoffs and will be looking for new revenue measures. So why not consider fiscal policies that provide revenue and at the same time increase efficiency, stimulate technological innovation, protect human health, and improve environmental quality?

Consider tax reform for a moment. Revenue from pollution charges could be utilized to lower other distortionary taxes as part of an innovative, *revenue-neutral* tax reform package. For instance, revenue from the charges mentioned above could be part of a fiscal package that lowers payroll or marginal income tax rates. Alternatively, if the President's Advisory Panel on Tax Reform recommends eliminating the double taxation of corporate dividends, the foregone revenue could be offset by a carefully crafted carbon levy.

This essentially entails a *tax shift*. We reduce taxes on things we want more of—namely work and savings—and compensate by increasing taxes on things we want less of—namely pollution and waste. A tax shift could help mitigate the impact of pollution charges on low-income households, affected businesses, or others. Some tax shifts may be more beneficial in terms of economic efficiency while others better in terms of equity,³³ so policymakers should carefully consider the designs.

Alternatively, we could go *beyond* revenue-neutrality and use the proceeds from pollution charges to contribute to federal deficit reduction. This would help ensure that the government is able to meet commitments to important policy goals such as social and national security, and it would help us avoid passing the burden of higher taxes onto our children. Again, as Alan Greenspan and others have recently noted, new revenue measures likely will be part of an eventual deficit reduction package. Although they alone won't solve the deficit crisis, pollution charges could be an attractive part of the solution.

Summary

In conclusion, these four observations suggest that taxes and the environment have quite a bit to do with one another. First, fiscal policies impact environmental health while environmental policies can contribute to fiscal health; it's a two way street. Second, there are a number of current tax expenditures that, if eliminated, not only would improve the environment, but also would simplify the tax code, reduce the deficit, and improve market efficiency. Third, when considering *what* to tax, we should consider placing more of the burden on activities that make the economy unproductive and that reduce our quality of life, namely resource waste and pollution. Finally, we could incorporate revenue from pollution charges into tax reform or deficit reduction initiatives and thereby achieve both fiscal and environmental improvements.

¹ To meet its obligations under the Montreal Protocol, the U.S. established quantity restrictions on chlorofluorocarbons (CFCs) and halons accompanied by a trading system for CFC production rights. The U.S. also introduced a levy on ozone-depleting substances to further encourage the introduction of CFC substitutes and to prevent windfall profits from accruing to the private sector due to scarcity rents created by the quantity restrictions. There is some debate among economists regarding the relative impact of each policy measure. See Barthold, T. 1994. "Issues in the Design of Environmental Excise Taxes." *Journal of Economic Perspectives* 8 (1): 133-151.

² Internal Revenue Service. 2004. *Farmer's Tax Guide*. Washington, DC.

³ Rivlin, A. and I. Sawhill (eds). 2004. *Restoring Fiscal Sanity*. Brookings Institution Press, Washington, DC.

⁴ For example, see comments by Bruce Bartlett in Krugman, P. "The Dishonesty Thing", *The New York Times*, September 10, 2004, page 25.

⁵ Henderson, N. "Greenspan Says He Expects a Tax Increase", *Washington Post*, April 22, 2005, page E01.

⁶ See Olson, P. "Tax Reform Materials." Memorandum for Secretary O'Neill. U.S. Department of the Treasury. November 7, 2002; Crutsinger, M. "Bush's Tax Overhaul May Be Incremental". Associated Press, December 21, 2004; Rozenberg, G. "America's Richest Expect Tax Cuts as Review Starts". The Times (London), February 14, 2005, page 42; Wolf, R. "Ending Alternative Minimum Tax Could Be Costly, Panel Leaders Warn." USA Today, May 18, 2005, page 2A.

⁷ Koplow, D. 2003. "Durante Way Off Base in Support for H.R. 6." Earth Track, Inc., Cambridge, MA.

⁸ Joint Committee of Taxation. 2005. *Estimates for Federal Tax Expenditures for Fiscal Years 2005-2009*. Washington, DC.

⁹ Nayak, N., Pica, E., and A. Roder. 2004. *Green Scissors Report 2004*. Friends of the Earth, Washington, DC.

¹⁰ While recognizing that there are legal distinctions between environmental taxes and fees, the author is using the generic term "charges" to broadly refer to both for the purpose of this paper. For an outline of these distinctions, see Repetto, R., R. Dower, R. Jenkins, and J. Geoghegan. 1992. *Green Fees: How a Tax Shift Can Work for the Environment and the Economy*. World Resources Institute, Washington, DC.

¹¹ Repetto, R., R. Dower, R. Jenkins, and J. Geoghegan. 1992. *Green Fees: How a Tax Shift Can Work for the Environment and the Economy*. World Resources Institute, Washington, DC.

¹² Pollution charges create incentives for firms to reduce emissions to the point where the incremental cost of reducing pollution (marginal abatement cost) is equal to the charge rate. In situations where directly measuring emission levels proves difficult or prohibitively expensive, pollution charges could be assessed on the product the use of which generates emissions. More information about pollution charges can be found in Portney, P. and R. Stavins (eds.). 2000. *Public Policies for Environmental Protection*. Second edition. Resources for the Future, Washington, DC.

¹³ Auctioned tradable pollution allowances/permits can offer the same listed advantages.

¹⁴ This is one respect in which pollution charges differ from tradable pollution allowances/permits that are distributed freely to polluters, as is the case in the U.S. sulfur dioxide cap-and-trade regime.

¹⁵ Stavins, R. 2001. *Experience with Market-based Environmental Policy Instruments*. Regulatory Policy Program Working Paper RPP-2001-11, Harvard University, Cambridge, MA.

-
- ¹⁶ Wang, H. and D. Wheeler. 1996. *Pricing Industrial Pollution in China: An Econometric Analysis of the Levy System*. World Bank, Washington, DC
- ¹⁷ These and additional parameters can be found in Repetto, R., R. Dower, R. Jenkins, and J. Geoghegan. 1992. *Green Fees: How a Tax Shift Can Work for the Environment and the Economy*. World Resources Institute, Washington, DC.
- ¹⁸ Goolsby, D., W. Battaglin, G. Lawrence, R. Artz, B. Aulenbach, R. Hooper, D. Keeney, and G. Stensland. 1999. *Flux and Sources of Nutrients in the Mississippi-Atchafalya River Basin: Topic 3 Report for the Integrated Assessment of Hypoxia in the Gulf of Mexico*. NOAA Coastal Ocean Program Decision Analysis Series No. 17. Silver Spring, MD.
- ¹⁹ National Research Council. 1993. *Soil and Water Quality: An Agenda for Agriculture*. National Academy Press, Washington, DC.
- ²⁰ National Research Council. 1993. *Soil and Water Quality: An Agenda for Agriculture*. National Academy Press, Washington, DC.
- ²¹ Greenhalgh, S. and A. Sauer. 2003. *Awakening the Dead Zone: An Investment for Agriculture, Water Quality, and Climate Change*. World Resources Institute, Washington, DC.
- ²² See Burtraw, D. and P. Portney, "A Carbon Tax to Reduce the Deficit," in R. Morgenstern and P. Portney (eds.). 2004. *New Approaches on Energy and the Environment*, Resources for the Future, Washington, DC. In addition, to help allay concerns about global competitiveness, the U.S. could use "border tax adjustments" (BTAs) under which the domestic levy is applied on imports and rebated on exports. For further discussion about BTAs and allowance under WTO rules, see Hoerner, J.A. 1998. *The Role of Border Tax Adjustments in Environmental Taxation: Theory and U.S. Experience*. Working paper. Center for a Sustainable Economy, Washington, DC.
- ²³ Approximately \$1.35 - \$6.80 per metric ton of carbon dioxide equivalent.
- ²⁴ Chicago Climate Exchange. *Market Data*. Available on-line at: <http://www.chicagoclimatex.com/trading/stats/daily/index.html>. Accessed May 25, 2005.
- ²⁵ National Commission on Energy Policy. 2004. *Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenges*. The National Commission on Energy Policy, Washington, DC.
- ²⁶ Calculation based on Energy Information Administration. "Quick Stats", U.S. Department of Energy, Washington, DC. Available online at <http://www.eia.doe.gov/neic/quickfacts/quickoil.html>; Burtraw, D. and P. Portney, "A Carbon Tax to Reduce the Deficit," in R. Morgenstern and P. Portney (eds.). 2004. *New Approaches on Energy and the Environment*, Resources for the Future, Washington, DC.
- ²⁷ Estimates are indicative only and are based on current U.S. carbon dioxide emissions by fossil fuel used for energy generation. U.S. Environmental Protection Agency. 2005. *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2003*, Table 3-3. U.S. Environmental Protection Agency, Washington, DC.
- ²⁸ Mankiw, N.G. 1999. "Gas Tax Now!" *Fortune* 139: 10, page 60.
- ²⁹ *The Economist*. 2005. "The Real Trouble with Oil." 375: 8424, page 9.
- ³⁰ Energy Washington Week, "Duke Push for Carbon Tax May Signal Shift Toward Nuclear Power", April 13, 2005.
- ³¹ Emissions from non-utility industry sources and hazardous waste incinerators represent approximately 39% of U.S. airborne mercury emissions. A pollution charge could complement existing regulations of these sources, creating incentives for further emissions reductions. These sources are not covered by the recently announced EPA "mercury rule", which addresses coal-fired utility boilers.
- ³² User fees are not "pollution charges" *per se* but rather are a different type of environmental charge. In the context of this paper, user fees are taxes assessed on access to or use of publicly held resources. The revenue raised by user fees usually funds specific direct expenditure programs. Candidate targets for introducing or increasing user fees include grazing rights on public lands, recreational use of national forests and other public lands.
- ³³ The impact on efficiency and equity will depend on how the revenue is recycled. Furthermore, the reader should note that although using the revenue from a pollution charge to lower marginal rates of other taxes can reduce the total economic cost of the environmental policy, it still may reduce welfare if the environmental benefits are not included in the economic calculations. Thus, environmental charges should be justified primarily for their environmental benefits, not reform of the tax system *per se*. For discussion of this issue and the "double dividend" debate, see Goulder, L. 1995. "Environmental Taxation and the Double Dividend: A Reader's Guide." *International Tax and Public Finance* 2: 157-183; and Parry, I. "Pollution, Taxes, and Revenue Recycling." *Journal of Environmental Economics and Management* 29: 64-77.

ATTACHMENT B

Tax Reform and the Environment:

“Removing Fiscally and Environmentally Detrimental Tax Expenditures”

Steve Ellis
Vice President
Taxpayers for Common Sense

I appreciate the opportunity to present Taxpayers for Common Sense’s views on environmentally harmful tax expenditures that are ripe for elimination. In the big picture these provisions make little economic, fiscal or environmental sense.

When you survey the tax code, there are tax expenditures – tax provisions – that are directed to every imaginable economic activity or interest, from bow & arrow manufacturers to horse racing, from rum manufacturers to yacht owners.

As a budget watchdog, we obviously think eliminating many of these provisions that have spread like weeds since the 1986 reforms would be a sound foundation of any tax reform effort. But we have limited our presentation today to those that have a negative environmental impact.

There are several key factors to remember about tax policy. One is that, believe it or not, the Second Law of Thermodynamics can be applied to tax complexity. Or more appropriately, what I’ll call tax entropy. Entropy is the scientific rule that dictates that over time, all matter moves from an ordered state to less ordered state. This certainly holds true with tax policy. No sooner do you clean up the tax code - like in 1986 - than complexity creeps back in. Provisions like the sales tax deduction have come back to life like a zombie in a “B-movie” horror flick. Some have estimated that there have been 10,000 changes to the tax code since the 1986 Act was passed.¹ It seems that every effort by Congress to tweak the tax code ends up creating a host of new, convoluted tax provisions. Last year, for example, Congress passed a bill to fix a trade-distorting subsidy. A relatively straightforward \$5 billion fix mushroomed into a \$140 billion behemoth that included hundreds of unrelated tax provisions.

We cannot afford to throw up our hands and give up in the face of tax entropy. A pockmarked, scattered tax code invites confusion, increases costs, reduces transparency and generally engenders skepticism among the populace that everyone is paying their fair share. Occasional housecleaning helps consolidate and simplify important provisions, provides an opportunity to remove redundancy or waste, and closes unintended loopholes.

There is a final critical point to remember about the code: no fix, no change is ever easy. In this day and age, every tax expenditure and provision has a constituency behind it. No matter what, eliminating any item in the tax code will gore someone’s ox. While each

provision has lobbyists, members of Congress and advocates supporting it, we cannot allow that to dissuade us from simplifying and improving the code.

As we all know, taxes are not only intended to pay the bills of the federal government; they are also designed to influence our behavior. Exceptions to income taxes (earned and unearned) and excise taxes are meant to encourage certain activities. The most commonly cited example of influencing behavior regards homeownership. Years ago, we decided that we wanted to be a nation of homeowners, so we made interest paid on a mortgage tax deductible from income tax. You can't deduct rent payments, creating a clear incentive to obtain a home mortgage. Homeownership rates in the U.S. are just under 70 percent², far higher than most countries. But there are consequences to all incentives, including this one.

When considering tax expenditures that harm the environment, there are a few general categories. One is expenditures with relatively direct impacts: subsidies for extractive industries, for example.

I'll borrow from the game of billiards and call the second category "bank shots." You have to think about them a little more carefully to see the impact because it's at least a two step process. The SUV business tax break that was mentioned is one such example.

Finally, there are the mixed signals, or cross subsidies that end up sending the wrong signal to a taxable entity.

Direct Impacts

I'll start with the direct, which will almost exclusively be a discussion of the energy-related tax breaks:

Energy Tax Policy - The American economy depends heavily on fossil fuels, in part because federal tax policy has kept them inexpensive. While energy tax policy as a whole has been shaped by the coming and going of different administrations, the federal government's incentive structure has always favored conventional sources, notably oil and gas.³ The impact of these subsidies are quite clear: the U.S. uses four times as much oil as any other nation,⁴ and fossil fuels add up to more than 85% of the energy used domestically.⁵

It is hard to imagine a sector that benefits from the tax code as much as the energy industry does. Some of the tax benefits include accelerated depreciation of assets, tax credits for production at marginal wells, and immediate expensing of intangible drilling and development costs. The tax code's generous expensing of exploration and development costs for environmentally harmful extractive industries alone will cost the federal government more than \$17.1 billion over the next five years.⁶

As a federal fiscal instrument, energy tax policy is supposed to be used to correct a problem in the marketplace, or to reach some type of social, environmental or fiscal

objective. Yet in reality, energy tax policy has been politicized, driven by politicians' desires to prop up their favorite company, assist cherished special interests or help trade associations make their members richer, rather than create true incentives to push industry to find bigger and better ways to drill and or conserve more energy. Because of this influence, tax policy generally creates new distortions by intervening in the market rather than fixing current problems. At the same time, tax policy has not reduced our dependence on foreign sources of oil.

Percentage Depletion Allowances - Percentage depletion allowance lets certain oil and gas producers claim a tax write-off when the value of their assets decline over time – that is to say, as their wells are depleted. Current law allows independent producers, but not integrated oil companies, to deduct up to 15 percent of the gross income from an oil or gas producing property, so long as the deduction does not exceed 65 percent of the net taxable income from that property in any year (referred to as the “net-income limitation”).⁷ In years where a well's percentage depletion is greater than the 65 percent threshold, the well's producer can carry the deduction over to future years until it is fully utilized.

The problem with percentage depletion is that it often allows firms to deduct in excess of their original investment on the well. This lucrative tax provision will cost the federal treasury about \$3 billion over the next five years, and it leaves certain oil and gas producers with tax rates that are much lower than most other industries.⁸ A related percentage depletion allowance for hard rock mining will cost taxpayers an additional \$900 million over five years.⁹ Proponents argue that the percentage depletion write-off helps to create economic incentives to get energy companies to produce more oil and gas domestically. But with oil hovering around \$50 a barrel, many wonder why the oil and gas industry needs any government incentives at all – they already have all the incentive they need.

Section 29 - In 1980, Congress established a tax credit in Section 29 of the Internal Revenue Code for companies producing fuels from nonconventional sources. Created as a part of the Crude Oil Windfall Profit Tax Act of 1980, proponents of the Section 29 credit argued it would increase development of alternative domestic energy sources at a time when concerns about oil import dependence and national security were high. Section 29 applies to fuels such as oil produced from shale or tar sands; gas produced from pressurized brine; Devonian shale; tight formations; biomass; and coalbed methane, all of which were deemed "uneconomical" for conventional production.¹⁰

Section 29 grants a \$3 per barrel or \$0.50 per thousand cubic feet tax credit. The production tax credit began at \$3 per barrel of oil equivalent and was designed to phase out as oil prices rose from \$23.50 to \$29.50 per barrel. However, both the credit and the phase out were tied to inflation. Currently, the credit is worth more than \$6 per barrel and more than \$1 per thousand cubic feet, and oil prices must reach between \$47 to \$60 for the phase out to occur. Despite oil being in the \$50 dollar range, producers have still been able to claim this credit. This tax credit will cost \$4.0 billion over the next five years.¹¹

Exemption for Income Earned by Public Electric Power Utilities – Unlike private or investor-owned utilities, public utilities are exempt from federal income tax on income earned from their facilities for generation, transmitting and distributing electricity. This tax expenditure can lead to increased consumption and inhibits competition in the marketplace with private power. Eliminating this provision could save \$3.6 billion over the next five years.¹²

Many More – There are many more tax expenditures that encourage environmentally harmful activities, expensing of exploration and development costs for nonfuel minerals (\$300 million over five years), expensing and amortization of timber-growing costs (\$1.1 billion over five years).¹³

Where Does it Get Us

As you can see, for decades every energy and other extractive industry has fought to get their piece of the tax policy pie. Some still believe that the nation's distorted tax priorities can be balanced by adding additional breaks that favor newer energy sources or sustainable activities that are currently underrepresented in the nation's tax code. So you end up with credits for electricity production from renewable resources (\$2 billion over five years), credits for investments in solar and geothermal facilities (\$100 million over five years), and other scattered credits.

Instead of nibbling at the edges of tax policy through small provisions, we believe that government should eliminate all the tax subsidies and let the market take its course. The only way you can level the playing field is through subtraction and simplification in the tax code. For all of the advocates of renewable energy out there, they will always be outmanned and outgunned by the forces of big energy.

Hybrid Vehicle Tax Credit - Even tax expenditures purportedly written for the environment can have little effect, or even worse, unintended consequences. The much touted \$2,000 tax credit for hybrid vehicles appears to be having very little effect. Why do we need to be encouraging this? Given that demand outstrips supply of these vehicles, this expenditure has no effect other than reducing revenue and adding complexity.

Federal tax policy should be designed to alter consumer vehicle choices, not to reimburse consumers for choices they'd make anyway. This tax break probably isn't working because it's putting money into the pockets of people who would have bought this product even without a tax incentive.

The Toyota Prius, for example, was the best selling hybrid vehicle last year; it is bought generally by couples with no children making at least \$100,000 per year. Jack Black, the actor may own one, but the tax credit isn't creating enough of an incentive to the average American family to go out to the dealership to buy one.¹⁴

Congress and the President want to encourage emerging technology that can help the environment. But will raising the tax credit to \$4,000 as the President proposes encourage

families not considering a hybrid vehicle to actually purchase a vehicle? Will it create a broader market than currently exists?

Bank Shots

SUV Tax Credit - Under current tax policy, the U.S. government grants a \$25,000 tax break for the business purchase of sports utility vehicles over 6,000 pounds. The original intent of the provision was to increase capital investments by farmers and other small business owners who rely on light-trucks or vans (i.e. construction companies). When this provision was added to the tax code, luxury passenger SUVs were not the market force they have become, and it appeared a good way to help small business owners by accelerating depreciation and avoiding a luxury-tax surcharge.¹⁵

The problem has arisen largely because the tax code classifies vehicles by weight instead of function. First, a truck or van is defined as a vehicle that weighs more than 6,000 pounds.¹⁶ Before the advent of the SUV, this was a sufficient way to separate passenger automobiles from other classes of vehicles. But, the growth of the market for large, luxury SUVs has dramatically expanded the number of passenger vehicles weighing over 6,000 pounds. In addition, the weight classification of a passenger automobile is determined by the "unloaded gross vehicle weight," or the amount the vehicle weighs with nothing in it.¹⁷ SUVs are weighed according to the "gross vehicle weight" rating, which is the weight of the car itself plus the load the vehicle should be able to carry.¹⁸ This distinction makes it easier for certain vehicles to achieve the status of "light-truck" even if the actual vehicle weight is more in line with passenger automobiles.

The SUV break has been reduced from 100,000 to \$25,000, but it should still be eliminated.¹⁹ Buying a \$100,000 SUV still brings a \$58,000 tax deduction. This tax break isn't helping reduce our dependence on foreign oil. In fact, it does the exact opposite.²⁰ Expensing all business vehicles equally would save the federal treasury \$700 million over five years.²¹

Second Home Mortgage – Interest payments on second home mortgages qualify for a tax deduction.²² Think about where people most often buy a vacation home - in remote or environmentally sensitive areas. When my parents took the money they saved to send me to college and bought a second home, they bought in the hills of central Vermont. Don't worry, I went to college at the Coast Guard Academy – all of us paid for my education, and I guess, my parents' down payment. Other people buy their second home on the coast. The deduction helps people buy more permanent, elaborate homes than they would otherwise. This can have significant impact on local environments and certainly has contributed to the post-WWII coastal building boom.

Another interesting note on this tax expenditure. The provision is more expansive than many people realize: anything with basic living accommodations meets the threshold.²³ That means RVs and boats can qualify for this deduction.

Real Estate Tax – Real estate taxes are deductible, for all your homes, first, second, third, fourth – doesn't matter.²⁴ This has many of the same impacts of the second home mortgage deduction. Eliminating this provision would save \$74.1 billion over five years for the primary residence alone.²⁵

Mixed Signals

Tax expenditures inherently send many mixed signals. Attempts to influence behavior do not necessarily have the intended impact. For instance, the primary effect of creating a shelter to encourage savings may actually have its greatest effect of shifting savings from one type of vehicle to another with only a small increase in savings.

Other mixed signals provide cross subsidies that do not provide the purported incentives.

Harbor Maintenance Tax – The Harbor Maintenance Tax (HMT) is in effect a cross-subsidy between high and low maintenance ports. If eliminated or replaced with a true user fee – which the HMT is purported to be – costs and environmental damage could be significantly reduced. Implemented in 1986, the HMT is an *ad valorem* tax, that is a tax on the value of the commodities shipped, which actually has little to do with the cost of maintaining the port. In fact, the export portion of this tax was struck down by the Supreme Court as an unconstitutional tax on exports, because it was not a true “user fee” for maintenance.²⁶ The major factor in maintaining ports is dredging, which can have significant impacts on the environment, both aquatic and terrestrial (for disposal). By taxing a container ship full of DVD players entering the port of Seattle – a naturally deep, low maintenance port – the same amount as a similar container ship entering the port of New York / New Jersey – a significantly shallower, high maintenance port – we are providing expensive, environmentally harmful cross-subsidies. The Harbor Maintenance Tax is expected to yield roughly \$5 billion over the next five years, although only approximately 75% of the revenue raised is used on deepening or dredging projects.²⁷

A more equitable and environmentally sound proposal would charge container ships based not on the value of goods they carry, but on the impacts to the port they visit. This would mean that a trip to the port of New York / New Jersey would cost significantly more than a stop at the port of Seattle. Such a reform would discourage heavy traffic at ports that require frequent dredging, and shift traffic to ports that can handle more use. Alternatively, eliminating the HMT altogether would end an environmentally harmful cross-subsidy.

“Big Kahuna”

I've left for last what I'll call the “Big Kahuna”.

Mortgage Interest Deduction – Arguably the single most celebrated tax expenditure, the mortgage interest deduction, allows taxpayers to deduct up to \$1.1 million of the interest

on the debt they accrued to buy, build or improve their homes.²⁸ This tax expenditure was created after WWII to encourage Americans to buy homes. The concept that property ownership creates a stake in society far predates the republic. However, this tax expenditure – which I, like many Americans, use – also provides a significant incentive for newer and bigger development and sprawl. Concomitantly, this deduction provides a disincentive to more compact, urban development. Even reducing the size of this tax expenditure, by either eliminating the deductibility of second home mortgage interest or the amount of interest deductibility, would reap a significant savings. This tax expenditure comes to \$434.2 billion over five years.²⁹

I have highlighted only a few of the myriad of tax expenditures that affect the environment. In many cases tax simplification by subtraction – the elimination of certain tax expenditures - would help the environment and our pocket book far more than big spending programs. Taxpayers for Common Sense urges the President's Advisory Panel on Tax Reform to look closely at many of the expensive tax expenditures that could be eliminated, to increase federal revenues in these tight budgetary times³⁰ while helping the environment.

¹ Wells, Rob. "Bush Tax Panel's Breaux Seeks Income-Consumption Hybrid" Dow Jones Newswire. February 17, 2005.

² Home ownership rates are 69.1%. U.S. Department of Commerce. "Census Bureau Reports on Residential Vacancies and Home Ownership." Available at <http://www.census.gov/hhes/www/housing/hvs/qtr105/q105prss.pdf>

³ Lazzari, Salvatore. "Energy Tax Policy," Congressional Research Service. January 10, 2005.

⁴ National Commission on Energy Policy. "Ending the Energy Stalemate: A Bipartisan Strategy to Meet America's Energy Challenge." December 2004. 2.

⁵ Ibid. 41. The source breakdown is : 40 % Oil. 23% Natural Gas. 23% Coal. 8% Nuclear. 6% Renewable and Hydropower.

⁶ Congressional Budget Office. "Budget Options." February 2005. 302.

⁷ Independent Petroleum Association of America. "IPAA Fact Sheet: Percentage Depletion Modifications." February, 2005.

⁸ Joint Committee of Taxation (JCT). "Estimates for Federal Tax Expenditures for Fiscal Years 2005-2009." January 12, 2005. 30.

⁹ Ibid. 31.

¹⁰ Previously synthetic fuels (synfuels) produced from coal were under the group of section 29 credits. But under H.R. 4520, the "American Jobs Creation Act of 2004," refined coal was moved to become a tax credit under Section 45.

¹¹ Joint Committee of Taxation (JCT). "Estimates for Federal Tax Expenditures for Fiscal Years 2005-2009." January 12, 2005. 31.

¹² Congressional Budget Office. "Budget Options." February 2005. 304.

¹³ Joint Committee of Taxation (JCT). "Estimates for Federal Tax Expenditures for Fiscal Years 2005-2009." January 12, 2005. 31.

¹⁴ Payne, Henry. "Hybrid Liberalism: The government and Detroit's Big Three are trying to change the way you look at your car." The Weekly Standard. January 24, 2005

¹⁵ The luxury excise tax on passenger automobiles expired on 12/31/02. It has not been reinstated yet.

¹⁶ 26 U.S.C. 280F(d)(5)(A)(ii).

¹⁷ Ibid.

-
- ¹⁸ Bill Sanders. "Annual Depreciation Limits and Gross Vehicle Weight Ratings for Trucks, Vans, and Sport Utility Vehicles." undated. Available online: <http://www.biz.colostate.edu/faculty/cherieo/GrossVehicleWeights.doc>.
- ¹⁹ The SUV provision was reduced from \$100,000 to \$25,000 in the American Jobs Creation Act of 2004.
- ²⁰ Business purchased SUV's also receive a "bonus deduction" from 30% to 50%, which they can utilize in the first year of purchase on the amount above the initial deduction. The bonus deduction in addition to the five-year depreciation schedule, which remained the same.
- ²¹ Congressional Budget Office. "Budget Options." February 2005. 308.
- ²² Internal Revenue Service. "Publication 936, Home Mortgage Interest Deduction."
- ²³ Caswell, Chris. "Can you deduct you boat? Read on" Motorboating. Available at <http://www.motorboating.com/motorboat/features/article/0,12696,1043556,00.html>. The requirement is that the second "home" have sleeping, dining, and toilet facilities.
- ²⁴ IRS Fact Sheet. 3.6 Itemized Deductions/Standard Deductions: 6. Real Estate (Taxes, Mortgage Interest, Points, Other Property Expenses). Available at <http://www.irs.gov/faqs/faq3-6.html?source=ttcom4home1>.
- ²⁵ Joint Committee of Taxation (JCT). "Estimates for Federal Tax Expenditures for Fiscal Years 2005-2009." January 12, 2005. 33.
- ²⁶ *United States v. U.S. Shoe Corp.*, 523 U.S. 360 (1998).
- ²⁷ Statement of the American Society of Civil Engineers before the Subcommittee on Energy and Water Development on the U.S. Army Corps of Engineers budget for FY2006.
- ²⁸ This is an aggregate of all loans for first or second homes. This includes \$100,000 on home equity loans or other loans secured by the home.
- ²⁹ Joint Committee of Taxation (JCT). "Estimates for Federal Tax Expenditures for Fiscal Years 2005-2009." January 12, 2005. 33.

ATTACHMENT C

Tax Reform and the Environment:

Shifting Taxation from Income and Capital toward Pollution

Gilbert E. Metcalf
Department of Economics
Tufts University

It is a pleasure to participate in this forum on tax reform and the environment. Craig has introduced the idea of tax shifts as part of his broader message that taxes and the environment have much to do with each other. I'd like to focus more specifically on revenue neutral tax shifts where environmental taxes are used to finance tax reductions. I have two points to make in my presentation. First, the United States lags behind most other developed countries in its use of environmental taxes and charges as a component of its fiscal system. Second, our failure to avail ourselves of environmental taxes and charges means we are missing revenue opportunities which could help us tackle important fiscal issues in our federal budget. My overall message is that green tax shifts can provide considerable flexibility to policy makers to achieve difficult political and economic goals while contributing to a cleaner environment.

Environmental Charges: an Underutilized Resource

The first point to make is that the United States collects little in the way of revenue from environmental charges (including taxes) and what little we do collect is collected in an inefficient manner.¹ Even if we include taxes on motor fuels (which are – strictly speaking – not an environmental tax), environmental tax collections are trivial in the federal budget. Less than 4 percent of federal revenues came from excise taxes in 2004 roughly two-thirds of which could loosely be described as environmental in nature. Granted \$45 billion in excise tax revenues of a broadly environmental nature are not to be dismissed out of hand, we are far from maximizing our potential to tax activities that are detrimental to health and the environment here in the United States.

How does the United States compare with other developed nations? Here are a few comparison statistics. Considering environmental taxes at all levels (federal, state, and local), environmental taxes in the United States comprised 3.3 percent of total tax revenues in 2001.² By contrast, OECD countries as a whole collected 4.9 percent of taxes through environmental taxes. Denmark's environmental tax share, for example, was 10 percent in 2002; Germany's was 7.1 percent; the United Kingdom's was 7.5 percent. No country's environmental tax share in 2001 was lower than the United States' share.

¹ See Fullerton (1996) for an overview of environmental tax policy and the high costs of collection. Francis (1999) notes the decreased use of some environmental taxes in the 1990s.

² The source for these and subsequent tax share numbers is the OECD Economic Instruments Database.

In short, the United States is at the very bottom of the distribution in terms of the fraction of government revenue collected through environmental taxes and charges. Let me next turn to how we might use a green tax shift in the United States.

Green Tax Shifts: Some Possibilities

I'd like to discuss three examples of green tax shifts to illustrate how we might use environmental tax revenues to help us achieve important fiscal policy goals.

1. Carbon tax to finance corporate tax integration

A study that Kevin Hassett of the American Enterprise Institute and I did a few years ago explored instituting a carbon tax to finance corporate tax integration (Hassett and Metcalf (2001)). Based on our analysis using 1996 data, full corporate tax integration would cost just under \$50 billion in 1996 dollars.

The idea of a carbon tax combined with a reduction in existing taxes has been extensively studied.³ The focus on a carbon tax is a natural one given rising concerns about global warming. Emissions of carbon dioxide (CO₂) in 1990 totaled 1,365 million metric tons of carbon and increased to 1,581 million metric tons in 2002, according to the most recent report on greenhouse gas emissions from the Energy Information Administration (2004). A carbon tax is an obvious policy tool to help reduce carbon emissions. A natural question is what to do with the carbon tax revenue. Research by a number of economists has indicated that reducing the tax on capital income financed by environmental tax revenues would provide the greatest efficiency gains relative to other uses of the tax revenue. Corporate tax integration is a way to reduce the tax on capital income.

Corporate tax integration is an effort to subject all income to a single income tax. The United States, like many countries, has a personal income tax and a corporate income tax and treats these two taxes as separate and distinct. Thus, income earned in the corporate sector can be subject to a tax first through the corporate income tax and then through the personal income tax. Such a system leads to a number of tax induced behaviors which can have significant efficiency impacts:

- Payout Behavior: the corporate income tax affects the decision to pay out after-tax profits in the form of dividends or to retain earnings within the corporation.
- Financing Behavior: the corporate income tax influences the decision to finance new investments with equity or debt.
- Corporate Organization: the corporate income tax affects the decision to organize businesses as corporations or partnerships.

³ See, for example, Bovenberg and Goulder (1996) who consider cuts in the personal income tax financed by a carbon tax.

A 1992 Treasury study on tax integration estimated annual efficiency losses from the current tax system (relative to an integrated system) ranging from \$2.5 to \$25 billion (in 1991 dollars).

One of the objections to tax integration is its cost. The impetus behind the analysis that Hassett and I did is that the cost of tax integration can be paid for by revenues from a carbon tax. Such a "green tax reform" would be desirable both on environmental and efficiency grounds. We considered two forms of tax integration. First, we considered full integration where corporate income is allocated to individual shareholders and subject to tax at the personal level, what the U.S. Treasury in its report on corporate tax integration referred to as the Shareholder Allocation Prototype. Second, we considered excluding dividend income from taxation at the personal level, what the Treasury referred to as the Dividend Exclusion Prototype.⁴

We focused in that paper on the industry impacts of this green tax shift. Industries will be differentially affected by integration of the corporate and personal income tax. We would expect that industries which have high corporate pay-out rates would benefit from integration while industries that are dominated by a non-corporate organizational form would least benefit. The carbon tax, meanwhile, would most impact carbon intensive industries. We would expect that a green tax shift using a carbon tax to finance tax integration would lead to considerable variation across industries in benefits and costs.

Parsing out the impact is a bit complicated. The conventional view of the incidence of carbon taxes is that they will be passed forward in the form of higher product prices to consumers. Our analysis follows this approach and translates the intermediate goods taxes into higher industry prices as energy intensive inputs (now more expensive) are used in the production of downstream goods. Corporate tax integration, by reducing the double taxation of capital income should increase the income of owners of all capital (corporate and non-corporate).⁵ It is possible that in the context of a package reform where corporate tax integration is combined with a carbon tax, the entire package of taxes is passed forward in changes in prices of industry products. This follows as the higher prices of goods (due to the carbon tax) put domestic goods at a competitive disadvantage relative to imported goods. This competitive force makes it difficult for owners of capital to appropriate the gains from corporate tax reductions.

If this argument is correct, then the price changes we report in that research can be viewed as a measure of the industry incidence impact of the tax reform. Alternatively, it may be that the conventional story continues to hold and that the carbon tax is passed forward into higher prices while the corporate tax integration tax reductions accrue to owners of capital (are passed backward). Rather than attempt to determine the ultimate incidence of this complex reform, we took a different tack. We constructed a statistic that we call the Breakeven Incidence Share (BIS). The BIS represents what fraction of

⁴ See U.S. Department of the Treasury (1992) for a comprehensive discussion of integration issues.

⁵ This result was first shown by Harberger (1962) and this incidence assumption is frequently used (see, for example, Pechman (1985)).

the carbon tax must be shifted back to shareholders to offset the gains from corporate tax integration. For example, if an industry experiences a price increase of 4 percent due to the carbon tax and the equivalent of a 0.4 percent decrease due to corporate tax integration, then the BIS is 10 percent. In other words, so long as no more than 10 percent of the carbon tax is shifted back to capital owners, the benefits of corporate tax integration exceed the costs of the carbon tax from the perspective of capital owners.

I'll simply note some of the results from our analysis of full integration. First, if all tax impacts were passed forward in the form of industry product prices, there is considerable variation in the price changes. Of the fifty industries we tracked in our 2001 paper, twenty nine industries faced price increases and twenty one faced price decreases if a carbon tax were used to finance complete corporate tax integration. Petroleum, coal mining, and utilities are disproportionately impacted by a carbon tax with price changes of 6 to 12 percent. Beyond those industries, price increases ranged from .02 to 1.21 percent while price decreases ranged from .02 to 1.84 percent.

Comparing the two price changes is only appropriate if the reduction in capital income taxation is passed forward to consumers in the form of lower prices (or if the carbon tax is passed back to capital owners in the form of lower returns). As an alternative approach to understanding industry impacts, we reported our measure of the required amount of pass-back in the carbon tax possible before equity holders are adversely affected by this reform. For the three industries most heavily impacted by a carbon tax we found that so long as no more than 5 percent of the carbon tax was passed back to equity holders in the form of lower returns, returns to shareholders would not fall following this green tax reform.

Summing up, tax integration financed by a carbon tax blunts to a modest degree the price increases that arise from the latter tax. If the carbon tax is fully passed forward to consumers, then the tax reform benefits the owners of equity in nearly all industry sectors. This is worth emphasizing. The standard incidence view is that a carbon tax would be passed forward to consumers in the form of higher product prices while capital tax reductions would be passed back to owners of capital. If this view is correct, business (or, more precisely, equity holders) would generally benefit from this environmental tax reform.

2. Environmental taxes to help achieve distributional objectives

The President's Advisory Panel on Federal Tax Reform is charged with thinking about ways to simplify tax collections and enhance efficiency in a revenue neutral context. The discussion above illustrates how environmental taxes could help us achieve considerable efficiency gains through capital income tax relief. My next example illustrates how environmental taxes can be used to achieve distributional objectives. Whether this is a goal of the Advisory Panel or not, the broader message in this example is that environmental taxes give lawmakers considerable flexibility to achieve a variety of goals given the fiscal constraints under which they operate.

A study I undertook a few years ago asked how we might carry out a revenue *and* distributionally neutral green tax reform. I hypothesized a green tax shift equal to ten percent of federal revenues in 1994.⁶ I modeled a new carbon tax, an increase in the motor fuels excise tax, new taxes on air pollution (or alternatively the federal sale of tradable permits giving firms the right to emit air pollution – as currently occurs under the SO₂ trading system for electric utilities and as proposed under the Bush Administration's Clear Skies Initiative. Finally I modeled a tax on unrecovered waste, a so called virgin materials tax.

The specific tax rates and amounts collected are not that important for our current consideration. Rather I'd like to emphasize that a common concern with environmental taxes is that they are regressive – that is they fall disproportionately on low-income individuals and households. My analysis confirmed this result when looking at the environmental taxes in isolation. I then modeled three tax reductions financed by the new (or increased) environmental taxes. First, I exempted from the OASDI payroll tax the first \$5,000 of tax base for each worker. For workers earning less than \$5,000 of covered wages, I exempted them entirely from the tax, both at the personal and business level. Next, I implemented a refundable \$150 tax credit for each exemption taken in the personal income tax. Finally, I modeled an across the board income tax cut of 4 percent.

The net result was an essentially distributionally neutral green tax shift. The point of this exercise was not to make a case for this particular reform. Rather it was to emphasize the key point that while environmental taxes may be regressive, an environmental tax reform can have whatever degree of progressivity policy makers choose. Any regressivity in the environmental tax can be offset by progressivity in the tax reductions financed by the new revenues.

The broader point in the context of the Advisory Panel's work on tax reform is that environmental taxes provide an additional instrument to help achieve whatever goals the panel has, whether they be related to efficiency, distribution, or some combination of the two.

3. Emission trading permit exercise tax

As my last example of an environmental tax, I turn to cap and trade programs like the SO₂ trading program for electric utilities implemented in the 1990 Clean Air Act Amendments or the various cap and trade programs such as proposed in the Clear Skies Initiative. Cap and trade programs such as the SO₂ program have a number of attractive features as recently documented in the 2004 *Economic Report of the President*. How permits are allocated is an important issue in their design. The SO₂ trading program grandfathered firms allocating permits to utilities on the basis of historic pollution levels. Grandfathering may make permit programs more palatable to affected industries but it means the government foregoes valuable revenue it could collect by selling permits to firms.

⁶ This is an ambitious goal and would represent new environmental taxes of roughly \$200 billion in the current fiscal year. I am reporting the research in Metcalf (1999) here.

A cap and trade program effectively creates barriers to entry for new firms since permits are required in order to operate. Work I did with Don Fullerton at the University of Texas notes that these barriers create economic rents for firms in the industry. Economic rent is a technical economic term that – loosely speaking – refers to profits that firms can obtain by restricting new entrants from competing with existing producers.⁷ A monopolist, for example, earns economic rents. The key point about economic rents is that they are a distortion free source of tax revenue, what economists refer to as a lump-sum tax. What Fullerton and I pointed out is that selling permits is functionally equivalent to levying a 100 percent tax on the economic rents that arise due to the barriers to entry created by the cap and trade system.

Proponents of grandfathering argue that the electric utilities industry, for example, is burdened by the restrictions in SO₂ emissions that arise from setting caps lower than historic emission levels. But the analysis Hassett and I did that I discussed before suggests a flaw in this argument. To the extent that higher costs (due to the need to purchase SO₂ permits) are passed forward into higher product prices, shareholders are unaffected by the permit policy. In fact, research has shown that a cap and trade system in carbon emissions need require very little grandfathering to compensate firms for their losses due to the need to purchase carbon permits. In fact, a cap and trade system that curtails emissions sufficiently to set a \$25 per ton price on emissions (in year 2000 dollars) only requires grandfathering 15 percent of permits in the oil and gas industry and – perhaps remarkably – less than 5 percent in the coal industry.⁸ The reason is that supply is sufficiently more elastic than demand that the bulk of the cost is shifted forward to consumers in higher product prices. Little cost is borne by shareholders and 100 percent grandfathering as occurs with the SO₂ trading program overcompensates the industry.

These observations suggest that the vast majority of tradable permits in future cap and trade programs should be auctioned by the federal government to raise revenue. How should we treat the current SO₂ trading system (and other trading systems)? We could begin to auction permits henceforth. This might be complicated given the banking and forward purchase of permits that has occurred. Alternatively, Congress could enact a *permit exercise tax*. This would be a tax levied on any firm that used a permit in order to emit sulfur dioxide. In other words, this is a tax on the right to exercise the permit. In 2003 electric utilities emitted 10.6 million tons of SO₂ emissions.⁹ A permit exercise tax of \$250 per ton would raise \$2.6 billion annually. Such a tax would capture a significant fraction of the economic rents generated by giving the permits to utilities in the first place.

⁷ Fullerton and Metcalf (2001)

⁸ I am reporting the work of Bovenberg and Goulder (2001) here.

⁹ Burtraw, Evans, Krupnick, Palmer and Toth (2005)

Conclusion

To conclude, I have tried to make two points. First, the United States relies to a much lower extent on environmental taxes than do other developed countries. We have considerable scope for green tax shifts before we put ourselves at a competitive disadvantage with other OECD countries. Second, a greater reliance on environmental taxes can provide considerable flexibility for policy makers to achieve difficult political and economic goals while contributing to a cleaner environment. Thank you very much.

Bibliography

Bovenberg, A. Lans and Goulder, Laurence. "Neutralizing the Adverse Industry Impacts of Co2 Abatement Policies: What Does It Cost?," C. Carraro and G. E. Metcalf ed., *Distributional and Behavioral Effects of Environmental Policy*. Chicago: University of Chicago Press, 2001, 45-85.

Bovenberg, A. Lans and Goulder, Lawrence H. "Optimal Environmental Taxation in the Presence of Other Taxes: General Equilibrium Analyses." *American Economic Review*, 1996, 86, pp. 985-1000.

Burtraw, Dallas; Evans, David A.; Krupnick, Alan; Palmer, Karen and Toth, Russell. "Economics of Pollution Trading for SO₂ and NO_x," *RFF Discussion Paper*. Washington, DC: Resources for the Future, 2005.

Energy Information Administration. "Annual Energy Review 2003," Washington, DC: Energy Information Administration, 2004.

Francis, Brian. "Federal Excise Taxes, Including the Slow Death of Expired Taxes." *Statistics of Income Bulletin*, 1999, (Summer), pp. 185-89.

Fullerton, Don. "Why Have Separate Environmental Taxes?," J. M. Poterba ed., *Tax Policy and the Economy*. Volume 10. Cambridge: MIT Press for the National Bureau of Economic Research, 1996, 33-70.

Fullerton, Don and Metcalf, Gilbert E. "Environmental Controls, Scarcity Rents, and Pre-Existing Distortions." *Journal of Public Economics*, 2001, 80(2), pp. 249-67.

Harberger, Arnold C. "The Incidence of the Corporation Income Tax." *Journal of Political Economy*, 1962, 70(3), pp. 215-40.

Hassett, Kevin and Metcalf, Gilbert E. "Environmental Taxes to Finance Capital Tax Reform," *Accurate Prices Program*. Oakland, CA: Redefining Progress, 2001.

Metcalf, Gilbert E. "A Distributional Analysis of Green Tax Reforms." *National Tax Journal*, 1999, 52(4), pp. 655-81.

Pechman, J. *Who Paid the Taxes: 1966-85?* Washington DC: Brookings, 1985.

U.S. Department of the Treasury. *Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once*. Washington, DC: U.S. Government Printing Office, 1992.

ATTACHMENT D

THE BROOKINGS INSTITUTION

**A BROOKINGS BRIEFING IN COLLABORATION WITH
THE WORLD RESOURCES INSTITUTE
ON
TAX REFORM AND THE ENVIRONMENT**

Friday, June 3, 2005

9:30 a.m. - 11:30 a.m.

The Brookings Institution
Falk Auditorium
1775 Massachusetts Avenue, N.W.
Washington, D.C.

[TRANSCRIPT PREPARED FROM A TAPE RECORDING]

PARTICIPANTS:

Moderator:

WILLIAM GALE, Deputy Director and Arjay and Francis Fearing Miller Chair,
Economic Studies, Brookings Institution;
Co-Directors, Urban-Brookings Tax Policy Center

Panelists:

CRAIG HANSON, Senior Associate, World Resources Institute

STEVE ELLIS, Vice President, Taxpayers for Common Sense

GILBERT METCALF, Chair, Department of Economics, Tufts University

Discussants:

WILLIAM FRENZEL, Member, President's Advisory Panel on Federal
Tax Reform;

Guest Scholar, Brookings Institution;
Former Member, U.S. House of Representatives

PAUL PORTNEY, President, Resources for the Future

QUESTIONS AND ANSWERS:

MR. GALE: All right, we'd like to—Bill Frenzel mentioned—let's have the mike up here—Bill Frenzel mentioned that the environment and the tax cultures are sort of separate. One of the differences I've noticed in

today's talk is that the environmental people actually stay on schedule, which is nice.

We want to turn to general discussion. I'd like to ask David Sandalow first—David, as I mentioned earlier, was instrumental in organizing this event and he graciously agreed not to be a speaker so we had room for these other gentlemen. So I won't emphasize that he needs to keep his question short, but I will emphasize that other people should first of all use the mike, second of all, keep your questions short, and, third, make sure you have a question.

Thanks.

MR. SANDALOW: Thanks, Bill, and thanks to all the panelists and discussants for a very interesting discussion. I've got a two-part question.

First, for Bill Frenzel, how should—what's the best way to influence the tax reform commission's work at this point by introducing some of these ideas? And indeed after the tax reform commission's work is done, what's the best way to introduce some of these ideas to Congressional committees, in your experience?

And then based upon Bill's answer to that question, I'd like to hear from the panelists and discussants whether the body of information that Bill is pointing at exists right now, and if it doesn't, what does it take to generate that information.

MR. FRENZEL: I, of course, cannot speak for the tax panel. I only speak for myself. Our panel has been, however, receiving information and will continue to do so as it works along. We are literally hip deep in information at the moment and our eyeballs are spinning trying to review it all.

But if there is information such as that that was presented today, I think it would be a good thing to go to the tax panel's website and send in whatever suggestions or papers you have electronically. I think that's the best way to do the job.

Admittedly, it's late in the game. We haven't made any decisions yet, I think it's fair to say, but we've done a lot of thinking and talking about these matters. But later is better than never, I guess is the way to describe it, and so that material ought to be presented, particularly specific ideas with whatever specific economic research might accompany it.

When the matter gets to Congress—well, first of all, the commission has to report to the Secretary of the Treasury. He, in turn, will report to the President, perhaps incorporating some of his own ideas. The President may or may not then submit a proposal of his own, which may be like his commission invented or may be his own ideas, to the Congress.

But that's when the food fights begin, and it is at that point where the usual lobbying procedures prevail. And people who are in support of these kinds of ideas ought to be heard up there and they ought to be

contacting individual Congressmen and members particularly of the tax-writing committees, because none of these are a given. The President may not like his advisory panel's recommendations. The Congress may not like the President's recommendations.

If you look in 1986 at the history of how things changed from the Don Regan first presentation through the Jim Baker second presentation, to the President's submission, to the Rostenkowski bill, to the Packwood-Bradley bill, and finally to the end, there were just a myriad of changes of direction. And so as Yogi says, it's never over until it's over, and so keep working the problem.

MR. GALE: Anyone else want to discuss whether there's a sufficient body of information to transmit to the tax reform panel?

MR. METCALF: Well, I think there's been a tremendous amount of research. Richard Newell has done some—I see him in the audience—Larry Goulder at Stanford. I've done work. A number of people have looked at both distributional issues as well as efficiency issues. I think there is a lot of material.

MR. GALE: Can you comment on the extent to which the literature speaks with a consistent voice on things like double dividends and distributional impacts and efficiency impacts, and Paul's comment about how, yes, it's a tax on the environment, but it's still a tax on labor and capital?

MR. METCALF: Well, I think the work that has looked at the distributional piece has very much taken the view that taxes are paid by people and has thought hard about the distributional impact.

My work, I think, has tried to—and I don't think I'm alone in this—tried to address the issue of how do we deal with the issue that environmental taxes typically are regressive. And I don't think it's controversial the view that an environmental tax reform—packaged correctly, you can get whatever degree of progressivity you want.

I think the other point about the double dividend that I think there is real consensus that using environmental taxes to lower capital income taxes buys you greater efficiency than if you want to lower labor taxes.

There's that equity efficiency tradeoff.

MR. PORTNEY: Bill, can I—

MR. GALE: Sure.

MR. PORTNEY: I'd like to jump in on that. I agree with Gib that there is a tremendous body of academic research that has been done that bears on this question. I think the shortcoming probably is using the analogy that I drew earlier to Joe Peckman's work on tax reform where he basically wrote a book each year that didn't contain a lot of technical analysis, but said if you take this exemption out, if you take this out, here's how much money you'll raise, it was sort of, you know, a cookbook for somebody to use.

And I think that's probably what places like World Resources Institute and Brookings, and I hope my colleagues at Resources for the Future will think about doing in the future is sort of simplifying this so that you can see if you tax this at this rate, here's how much revenue you could raise. And implicit in that is also assumptions about how much revenue you would lose because if you tax pollution, it becomes economical for sources to reduce pollution, after all. That's one of the things that we want them to do, and so the revenue base erodes a little bit.

And one of the things that I think is misleading about the discussion on environmental taxes is it's often not coupled with a very sophisticated set of assumptions about the marginal cost of reducing pollution so that we would know how much of the tax base would disappear.

So, you know, I guess what I'm saying is that I hope that this significant body of academic research is simplified so that people on Capitol Hill who don't have time to wade through elasticities and general equilibrium calculations, which are certainly important, can sort of understand, okay, if we did this and this and this, here's how we would do it, here's how much revenue we would raise, here's how much the base might erode over time because people reduce pollution, et cetera. We kind of need a Congressional handbook for how you would make these a part of the tax code, I think.

MR. : At least on the environmentally-harmful tax expenditures, I mean there is an existing Congressional handbook. I mean, every year

the not so much read Congressional Budget Office puts out their budget options every year, which is, you know, a great source of looking at a lot of different tax expenditures, looking at a wide range.

It doesn't take an opinion, but provides a lot of good information about various tax expenditures. Definitely a good source for the direct hit, so to speak, rather than like [INAUDIBLE.] And JCT, the Joint Committee on Taxation, comes out with tax compilation as well.

MR. : Yes. I agree with Paul on his comment here that the need for some type of taking some of the information that's already out there—as Gib was mentioning, there's a lot of analysis out there—but maybe simplifying it or packaging it such that it's actually more easily communicable to the target audience. I think there's a gap for that right now.

MR. GALE: In the back.

MR. : Doug Obey [ph] from—can you hear me now?

I just had a question for anybody who wants to take this on the issue of a lot of this discussion is obviously geared toward the President's recommendations on tax reform. What, if any interest, do the panelists see on the Hill in incorporating any of this into the energy bill, where I guess they're writing the tax provisions of that bill pretty much right now on the Senate side?

MR. : Can you speak up a bit?

MR. GALE: The question was about interest on the Hill, particularly in the current energy bill, in incorporating any sort of green taxes.

And you seem the right person to—

MR. FRENZEL: My guess it doesn't look that way to me, but I'm not a close student of it.

MR. : The energy bill has—there's virtually no interest particularly in the House of having ? in the energy bill. It's a lot of oil and gas. I mean, if you look at the overall cost of the bill—and we did an analysis and there's a significant amount of authorized spending. We're talking in the neighborhood of about \$90 billion.

But even when you look at the tax provisions, almost all of them are directed at the oil and gas industry, which is certainly not a green tax strategy.

MR. : Yes. Outside of the tax reform panel, I see the opening being—an opportunity for these ideas being more as Congress gets serious about dealing with the deficit situation, you know, over the next couple of years. So I think that's where you may see more of these opportunities for these ideas to be pushed and potentially getting traction.

MR. : Let me just jump in on that. The last time we seriously considered—the Clinton administration discussed BTU taxes at a time of very large deficits and efforts of fiscal restraint, and it basically felt flat on its face—the BTU tax, not the Clinton administration.

How do we factor that into what we think might occur, if and when Paul's good idea is ever going to occur?

MR. : Can I take a first crack at that?

MR. GALE: Yes, please.

MR. : Others who are more knowledgeable about this can correct me, but if you're a proponent of a carbon tax or any type of energy tax, the first question is, well, we tried this with the BTU tax and it didn't work. And my recollection is that that was a pretty failed experiment not because it was an inherently bad idea, but because shortly after they introduced the BTU tax as part of a comprehensive set of tax measures in which it was said everyone would have to bear some burden in order to deal with the deficit problem, somebody said, well, gee, now we've got to get some votes in the Senate, so we're going to exempt ethanol from the BTU tax.

And then somebody said, well, wait a minute now. How about electricity used in aluminum production, because we've got votes in the Pacific Northwest? And then said, okay, well, we'll take that out of the BTU tax. And before long, everybody else was thinking, hey, I'm the only schlemiel that's going to be paying the BTU tax.

And so right from the get-go, they began to sort of erode the idea behind it that this was part of a tax increase and expenditure reduction program that would spread the pain around and we would all have the benefit of getting the deficit in order.

So I don't really view that as, you know, a very fair test of whether or not a carbon tax that would be fairly applied and not have exemptions carved out right from the get-go might fare in Congress.

MR. GALE: Okay. Yes?

MS. : I'm Jill Barshee [ph]. I'm an economic policy reporter at Congressional Quarterly. And when I think about what Americans care about with the environment, they want to swim in clean oceans, breathe clean air, drink clean water. And other than by instituting new punitive pollution taxes, is there any way to get a really big, positive improvement in the environment by getting rid of some of these tax preferences?

Percentage depletion wells—I mean, you get \$3 billion. It doesn't offset even one year of AMT relief. Do you get a big environmental improvement out of something like that by getting rid of it?

MR. : Well, you do. You have to look a little bit further down the line. I mean, if you start looking at the other energy tax expenditures that I was talking about closing, you're going to see one is that oil and gas is going to become less artificially held down in the price. There's less subsidies going to the big energy companies which then will sort of level the playing field and give a better chance for renewable resources and other approaches which have a smaller environmental footprint. But I think that invariably these activities are going to have an impact, you know, whether you're talking about oil and gas development in the Gulf of Mexico, when you're talking about clean bodies of water. Or,

you know, I mentioned and talked about the harbor maintenance tax ? oils it had deposited in the oceans off of the coast of the U.S., and the other taxes.

I think that you have to add them all up. And, yes, absolutely, if you look at the home mortgage deduction, there's a lot of money there. But other than that, it's really going to have to be whittling at these various subsidies and going at it that way.

MR. FRENZEL: Americans do want clean air and clean water, but they want to drive an SUV and have a fully air-conditioned house. In short, they'd like the free lunch that everybody in the world likes.

It does seem to me in this discussion we've focused on two ways of dealing with environmental taxes. One would be to reduce the deficit, sort of the call to sacrifice. My guess is that we'll wait a good long time before we ever get a lot of volunteers stepping up waiting to sacrifice. The other way to do it is as a part of some tax reform proposal, if it is something like 1986. It seems to me that that is more likely to happen. It may not be the most desirable way to do it, but it is likely to be the first bus going by on which environmental taxes may be able to hitchhike. So that seems the most likely prospect to me.

MR. MITCHELL: Thanks, Bill. Gary Mitchell, from the Mitchell Report, and I've been working on how to frame this into a question and I think I can, but I want to say that this doesn't speak—my question doesn't speak specifically to the question of how you influence, for example, the

President's commission and/or the Congress on the specifics of tax policy, but on a broader question, which is how does the environmental set of interests mainstream itself into economic vocabulary.

I was thinking on the way down here today the Bureau of Labor Statistics will issue its unemployment numbers, and Wall Street is sort of waiting for that and lots of other places are waiting for that. So there's a sort of an economic signal.

And I wondered whether there is some measure or some measurements of environmental progress, or I suppose degradation, depending upon how one views the unemployment numbers, for example, that could be issued with some frequency, whether it's monthly or bi-monthly, et cetera, that work its way into the vocabulary of public policy, something simple.

I also just want to say that having taken copious notes today, there are a couple of things that I know I will remember without any difficulty. One is Paul's observation about the year-to-year growth in the American GDP is itself the 11th largest economy in the world. And I also like the show me a win-win and I'll show you a loser.

So, anyway, long way around saying how does the environmental set of interests work its way into the vocabulary of—

MR. GALE: All right, thank you.

MR. : To your point, just a few months ago, in fact, the WRI, the World Resources Institute, in partnership with a number of different organizations, just started publishing and releasing a report called the

Millennium Assessment, which actually looks not just at the U.S., but globally at global ecosystems—grasslands, the oceans, forests, et cetera, and looking at it actually not just in terms of hectares of forests deforested, et cetera, but also looking at it in economic terms in terms of the provisions that the environment actually provides to local communities and to nations, whether it's in terms of the national capital the country has in terms of its major industries, but also in terms of provision of fresh water, provision of clean air, provision of fish stocks and food for its inhabitants, et cetera, in an effort to kind of address what you're talking about, some type of a metric that on a periodic basis—it probably won't be every quarter, but on a periodic basis to say this is what's happening beyond just the general numbers you get from the United Nations of how many acres of forest they cut down, but more in terms of the economics of what does it mean for us in terms of what does the environment provide us economically.

So that is something that's brand new and is going to be a regular metric against which we can measure progress or lack thereof on the health of the environment.

MR. : You know, that's a very intriguing idea. When I think of the reports that come out of BLS, these are generally reports that tell us something almost instantaneously about income this year or production this year, whereas many of the environmental indicators we could come

up with are telling us about something that's going to impact us down the line.

So, for example, if we were to, say, have a carbon emissions report on a quarterly basis, I'm not sure how people would react to that. On the one hand, a high level of carbon emissions could be viewed, oh, gee, we're not doing a good job. That's a negative. On the other hand, oh, well, we're producing a lot of stuff, so this is sort of a positive indicator in terms of GDP.

It's difficult to see how you link these environmental indicators as something that the stock market is interested in, and I guess that's the trick is to know how to do that.

MR. : The only other thing I would add is I think rather than just looking at reports, part of it is who the environmental community is talking to, you know. For instance, I work for a budget watchdog. I work on national security issues, I work on general tax issues, I work on agriculture, insurance, all sorts of different things. And so bringing me to the table to talk about this issue broadens the perspective and broadens the discussion out a lot more.

I mean, on agriculture, for instance, you know, which isn't tax policy, but we're talking with all the have-nots in the current commodity system. So we're talking to fruit and nut growers, we're talking to hunger groups, we're talking to budget watchdog groups, we're talking to environmental groups. And so there's a huge left-right alliance, if you would, that's

working on that issue, and I think that's the way that the environmental community is going to be able to get its message and these issues in a much broader perspective is talking to people about things that they already care about rather than trying to get them to care about the environment.

MR. GALE: Yes?

MR. NEWELL: Richard Newell, Resources for the Future. Correct me if I'm wrong, but my sense is that the main focus of the current tax reform effort is on federal personal income tax, okay. And one of the things that is apparently off the table is the big kahuna that Steve Ellis referred to kind of from the get-go.

MR. : ? what?

MR. NEWELL: The big kahuna is off the table, namely the mortgage interest deduction, at least from the President's perspective. And the focus within personal income tax is mainly on tax simplification, if I understand at least what I've heard so far, so things such as moving toward a consumption tax or moving toward a flat tax.

And so what I'm curious about is what would be the environmental implications, if any, of choosing between these different types of tax simplification for personal income tax.

MR. FRENZEL: Well, we already had one of our speakers indicate an analysis of the VAT from a number of aspects to really give you an idea of how to proceed. And yet the panel is looking at, I suppose,

simplification, looking at different styles of taxation—sales tax, VAT, ? taxes, ex [ph] taxes, several kinds of VATs.

All of these things are possibilities, and within any of them I suppose environmental taxes can be fit. And, you know, there are also—Chairman Greenspan suggested we needed a combination of taxes. So it is sort of open.

The big kahuna is off the table, but so are some little kahunas like charitable contributions, et cetera. So there are a large number of restrictions, and I guess the moral of the story is that this is only the first step in a very long journey. The report of that panel will be very important, but what comes out the far end of the policymaking process may be quite different and there is plenty of time to influence what that final result is going to be.

MR. : One brief follow-up to what Bill Frenzel has said. I think it's great in discussions like this—and I've been in forums like this before where you're talking about the elimination of the deductibility of mortgage interest when people look so serious about it. And we're all thinking, oh, please, God, don't let them eliminate that deduction. With such aplomb we have this discussion, when, in fact, deep down we're all thinking, oh, my God, think how much more I'd pay in taxes.

MR. GALE: Let me add a comment on that. There are other options besides keep the deduction and eliminate it. To the extent that the deduction is meant to encourage home ownership—and that's a debatable

proposition, since it was in the original income tax in 1913 which only applied to the top 1 percent of all households, a group among whom we don't think home ownership rates are a big issue.

But, anyway, to the extent that it's supposed to address home ownership, you could address that with a mortgage interest deduction for the first \$100,000 of mortgage debt. Any home ownership issue goes away at that point. Likewise, you could convert it to a credit because if you want to encourage home ownership, you should subsidize home ownership, not the incurrence of debt to have home ownership.

So you could convert to a credit that was a fixed credit for up to the first \$100,000 of value of the house. That would, by the way, divorce it entirely from the tax system, which is what Great Britain has done.

There's no reason that we have to subsidize home ownership, A, on the margin the way the mortgage interest deduction does, and, B, through the tax code.

So there are a range of options for dealing with public policy toward home ownership that extend far beyond keep the interest deduction or get rid of it. And I hope that as the tax reform proposal goes through the stages that Bill Frenzel mentioned that these issues come on the table.

All right, back to environmental issues.

Other questions?

Yes?

MR. : Hi. Eric Pica [ph] from Friends of the Earth. The question is Friends of the Earth a number of years ago, I think, seven or eight years ago, tried to do some comprehensive tax reforms at the state level and at the federal level. And what we ran into is we had this huge body of academic knowledge, but we didn't have the language to communicate what a tax shift was.

And, in fact, we did some focus group work and we found out that nobody cared about tax-shifting, nobody knew what green taxes were. The communication of this idea, which I think is an elegant idea, wasn't getting to the public, and I'm wondering if the participants up here have done with their organizations or affiliations any type of work that kinds of points the way to how to talk about green taxes, environmental tax-shifting, et cetera.

MR. GALE: Usually, about taxes and green, they're thinking about a different green. But do any of you want to comment on public strategy?

MR. : I would just say one thing. I think this is an easier thing to talk about after September 11th of 2001 because the public does understand the risks of being dependent not just the Middle East but other countries in the world that don't seem to bear much goodwill toward the United States.

And one argument you could make for taxing carbon or certainly at least gasoline, because imported petroleum is the source of that, is that this is going to help make us less dependent on parts of the world that we

probably depend upon at some risk to the country. I think after that horrible event, I mean that's something that I think the public would understand, and that part of it at least would be a little bit easier to talk to them about.

MR. : I'd also say that that's a critical issue in terms of going forward not only in communication with the general public, but also in the communication with people on the Hill, as we were talking about earlier here. And so I think that's a critical next step for this type of work going forward.

But also to piggyback onto what you're saying, Paul, I think we may have more success in using language not just about the environment, but on other things, whether it's economic efficiency or leveling the playing field for industries or energy security, you know, things that the general public gets or that lawmakers understand that aren't necessarily environmentally-related, but are kind of ancillary benefits of some of the ideas we've been talking about today.

MR. FRENZEL: I think Dr. Metcalf's paper showed us some interesting ideas about how to deal with the fairness question. I think it's out there, but it's hard to assemble.

MR. : On specific tax issues, I mean it really comes down to tax expenditures tapping outrage, anger. You know what I mean? Still, it has been more than a year since we did our first white paper on the SUV

tax credit. Now, this may be a statement about the website, too. It still gets the most traffic of anything on our website, that SUV tax credit. People go there and look at that paper. It's amazing that it has had that much traction and it has captured that much imagination. And the key that we found over the years on issues like that is finding the nugget that gets you in the door to discuss with people and talking about the broader issues, talking about the bigger issues once they're already in the door and they're already interested.

MR. GALE: Let's take two more questions, one back here and then—okay.

MR. : I'm Nick Powers [ph] with the World Resources Institute, and I can't help but be tempted to disregard Paul Portney's advice and think about the political feasibility and receptivity at the same time that we're discussing ideas. And maybe that's because I'm already convinced it's a good idea.

But basically we know that there's going to be some significant political opposition to any carbon restraints through corporate interests and industry, and I was just curious if anyone could comment on kind of the counter-weight that whether there would be some corporate entities who see themselves as potential winners in a carbon-constrained world and would therefore be more willing to support carbon constraints in some form or another.

MR. GALE: Anybody?

MR. : Can I take a cut?

MR. : Well, we know that Duke Energy supports a carbon—

MR. : Right.

MR. : There are some firms, right, that would benefit from a carbon-restrained world even within certain industries—the Duke Energies amongst electric utilities, the GEs of the world who just recently announced that providing clean energy technology is going to be one of the major planks of their growth not only in the U.S., but in China and elsewhere going forward.

So I'm not saying that they would actually advocate actually doing this, but there are going to be winners. And I think what's interesting about one of the concepts that Professor Metcalf laid out was there is analysis out there that will show that there are some interesting alliances that are a potential.

For instance, in his model here you introduce a carbon levy to offset the elimination of double taxation of corporate dividends. You're going to have some winners. You're going to have those companies that pay a lot of dividends and aren't very energy-intensive—the big banks, insurance companies, et cetera—you know, his model shows that they actually end up winners in this game. So all of a sudden, you have potential allies, so to speak, of such a package that you may not naturally think of.

So, again, depending upon how it's designed, there are ways that certain industries can see that, net-net, they may end up on the positive end of things.

MR. GALE: Let me just add a comment on that that when the business community splits, one of two things happens. Either nothing gets through, as in the major tax reform efforts in the late '90s, or you get what someone mentioned last year with the ETI bill where there was a \$3 to \$5 billion hit on one industry, which obviously other industries were in favor of.

You know, industries that were not directly affected or firms that were not directly affected would support that hit on the affected firms. And the result there was they just broadened the umbrella large enough to bring everybody in. And, of course, they did that by making the bill so obscene that the whole business community would go for it. And so it may not be such a plus to note that there are some businesses or industries that are in favor of this.

Anyway, let's turn to the last question up front and then—

MR. : Thanks. Larry Wiseman [ph], American Forest Foundation. Slightly off the topic, but the topic was introduced when someone mentioned the public's desire for clean air and clean water.

East of the Mississippi River, most of those environmental benefits are produced by individuals and families who own forest land. And I was wondering if anyone on the panel might comment on the prospects or the

desirability of introducing tax policies that might enable these families to achieve the net cash flow that would enable them to stay on their land and not sell out to development. Right now, we're losing about 1.5 million acres a year of this forest land to development.

MR. : We need more revenue, not less. I mean, there are a lot of good things and we tend to encourage good things through the tax code. This is not the best time to be finding new good things to encourage by tax reductions, it seems to me. Though that may be a worthy thing, I hope we could find another way to do that. That's just my narrow perspective on this.

MR. GALE: That's a very broad perspective, actually.

So let me conclude by thanking the speakers and discussants for excellent presentations and thanking all of you for excellent questions.

[Applause.]

[Briefing concluded.]

ATTACHMENT E

FOUND ON FOLLOWING PAGE.

ENVIRONMENTAL TAXES TO FINANCE CAPITAL TAX REFORM

KEVIN HASSETT
AMERICAN ENTERPRISE INSTITUTE

AND

GILBERT E. METCALF
TUFTS UNIVERSITY

Accurate Prices Program
November 2001



**REDEFINING
PROGRESS**

FOR PEOPLE, NATURE, AND THE ECONOMY

www.RedefiningProgress.org

TABLE OF CONTENTS

Executive Summary 3

Introduction 7

Background..... 9

Modeling Approach and Analysis 15

Conclusion 23

Appendix A 25

References 30

REDEFINING PROGRESS is exempt from federal income tax as a charitable and educational organization described in section 501(c)(3) of the Internal Revenue Code of 1986, as amended. REDEFINING PROGRESS is a public policy organization that develops policies and tools to reorient the economy to value people and nature first. REDEFINING PROGRESS does not endorse or oppose any candidate for public office or otherwise engage in partisan activity.

www.RedefiningProgress.org

EXECUTIVE SUMMARY

INTRODUCTION

WITH *ENVIRONMENTAL TAXES TO FINANCE CAPITAL TAX REFORM*, REDEFINING PROGRESS continues its series of papers on the economic effects of environmental tax reform (ETR). ETR involves shifting taxes in a revenue-neutral way by increasing tax revenues from environmentally damaging goods and activities and reducing revenue from more productive tax bases, such as labor or investment. Climate change action through ETR would likely have minimal economic impacts on most industries.

Authors Kevin Hassett and Gilbert Metcalf explore one tax shift scenario whereby the money raised by a carbon tax would fund “corporate tax integration,” or taxing all corporate income at a single tax rate. Integration would eliminate the double taxation of corporate income paid as dividends, which under current U.S. tax law get taxed as corporate income and again as personal income. The federal government taxes dividends at rates as high as 61%, this compares to much lower rates on retained earnings (and subsequent capital gains).

The study concludes that such a tax shift would have very small effects on the taxes paid by most industries. Several sectors would benefit from the tax shift by paying less in taxes, and only the most energy-intensive industries would face significant adverse effects. To the extent that the most-affected industries can pass on a carbon tax to consumers, this would mitigate the impact of the tax shift’s effects on industry profits.

The authors argue that the proposed carbon-corporate tax shift makes environmental and economic sense for a number of reasons. Given the mandates of the Kyoto Protocol (which stipulates that the United States cut its carbon emissions by seven percent from 1990 levels in the years 2008-2012) a carbon tax would provide an important market incentive to help the United States meet this target. Even with the United States’ recent repudiation of the treaty, it remains likely that the country will eventually need to reduce carbon emissions.

Many economists argue that reducing the tax on capital income would provide the greatest efficiency gains for the economy. In addition to lowering overall corporate tax rates, corporate tax integration would eliminate higher tax rates on paying dividends vs. retaining income, structuring a company as a corporation vs. as a partnership, and equity vs. debt financing. Further, corporate tax reduction might be a necessary carrot for business to accept the imposition of a new carbon tax and to make a tax shift politically feasible.

PROPOSALS

HASSETT AND METCALF CONSIDER TWO DIFFERENT CORPORATE TAX INTEGRATION PLANS. THE FIRST, the Shareholder Allocation Plan (SAP), would tax all corporate income, whether paid out or retained, at the individual income tax rate, just like other forms of personal income. The SAP would convert the corporate tax into a withholding allowance, with all taxes on corporate income paid by shareholders when they receive income from dividends, corporate interest, or capital gains.

The SAP would thus eliminate an important distortion in our tax system—it would no longer tax corporate income paid as dividends at a higher rate than retained corporate income.

Environmental Tax Reform involves shifting taxes in a revenue-neutral way by increasing tax revenues from environmentally damaging goods and activities and reducing revenue from more productive tax bases, such as labor or investment.

Further, corporate income would be taxed just like personal income earned from other sources. However, it would create significant administrative complications. It also would reduce annual tax revenue by an estimated \$48.4 billion (in 1996 dollars), and therefore would require \$48.4 billion in carbon tax revenue to make the tax shift revenue neutral.

An alternative proposal is the Dividend Exclusion Protocol (DEP). The DEP would simply exclude dividend income from taxation at the personal level, subjecting them only to the 35% corporate income tax. Retained earnings would continue to be subject to both corporate taxation and capital gains taxation, which for individuals in the highest tax bracket would result in an effective tax rate of approximately 40%.

Because the DEP does not equate taxes on retained income and income paid as dividends, it does not achieve full corporate tax integration like the SAP. But it does greatly reduce the current difference in the tax rates between corporate income that is retained or paid as dividends. The DEP also offers a major advantage over the SAP in that it would require no new administrative costs or oversight. The authors estimate that integration using the DEP would cost \$31.2 billion in lost annual tax revenue to be made up by a carbon tax, another advantage over the more expensive SAP.

FINDINGS BY INDUSTRY SECTOR

BY REDUCING THE EFFECTIVE TAX RATES ON CORPORATE INCOME PAID AS DIVIDENDS OR INTEREST, THE SAP or DEP integration plans would especially benefit corporations with heavy dividend payouts or equity financing. Conversely, the carbon tax, while falling directly on fossil-fuel industries, would indirectly increase the tax burden of industries in proportion with their energy intensiveness.

Who ends up hurting or benefiting from the tax shift also depends on to what degree consumers end up paying for (or benefiting from) changes in business taxes. Economic tax incidence theory dictates that industries will attempt to pass the carbon tax on to consumers by raising the prices of their products, but they can do this only to the extent that competition and consumer price sensitivity will allow. Similarly, corporations will attempt to retain the tax savings resulting from corporate tax integration, but competition could force firms to pass these savings on to consumers by lowering the prices of their products.

Hassett and Metcalf report two statistics for each industry to measure the expected effects of the tax shift. First, they assume that all of the increased taxes from the carbon tax and the decreased taxes from corporate tax integration get passed on to consumers through the prices of goods produced by each industry. Taking into account how energy prices would change from the tax shift, they find that prices would rise in 29 of 50 industries analyzed and would fall in the other 21 under the SAP-carbon tax shift.

Under the DEP, consumer prices in 30 industries would rise. Not surprisingly, the three industries to be hardest hit by the tax shift are petroleum products, coal mining, and utilities. These industries' prices would rise 6-12% under the SAP and 4-8.5% under the DEP. Benefiting the most from the tax shift would be finance and insurance, both high-dividend industries that are not energy intensive.

However, besides the three industries most hurt by the carbon tax, the authors find that a large majority of industries would not have their prices changed drastically by the tax shift. Forty-seven of 50 industries would see their prices change from -1.84 to 1.21% under the SAP and between -1 and +1% under DEP, suggesting that the tax shift would have moderate effects on most industries.

The authors then consider the possibility that shareholders, and not consumers, would receive the benefits of corporate tax integration, which is a common economic assumption. They calculate a statistic called the "Breakeven Incidence Share" (BIS) for each industry. The

The authors find that a large majority of industries would not have their prices changed drastically by the tax shift.

BIS represents the percent of the carbon tax that must ultimately fall on shareholders for the price increase from the carbon tax to just offset the price decrease from tax integration. This measure assumes that shareholders receive the full benefits of integration. A lower industry BIS means the industry is more likely to be hurt by the tax shift, since it must pass on more of the increased costs of the carbon tax to break even.

The authors find that a large majority of industries have a BIS measure of greater than 40%, depending on which corporate integration plan was adopted. This means that almost all industries would come out ahead from the tax shift, as long as they passed on at least 60% of the increased costs of the carbon tax to consumers. The industries most hit by the tax shift (petroleum, coal mining, and utilities) have BIS measures in the 5-12% range. This means that these industries would likely face increased costs from the tax shift unless they passed 90-95% of the carbon tax onto consumers. Forty percent of the businesses analyzed would come out ahead even if they had to completely absorb the increased costs of the carbon tax.

The authors suggest that one way to soften the impact on those industries most affected by the carbon tax is to exclude 100% of these industries' dividends from taxation while only exempting 50% of dividends from other industries.

Hassett and Metcalf present evidence that the United States can introduce a carbon tax in its efforts to slow emissions that lead to climate change with small impacts on most industries.

IMPLICATIONS

HASSETT AND METCALF PRESENT EVIDENCE THAT THE UNITED STATES CAN INTRODUCE A CARBON tax in its efforts to slow emissions that lead to climate change with small impacts on most industries. Corporate tax integration offers two key advantages over other types of tax cuts in ETR: expected large efficiency gains and an enticement for business to back climate change action.

However, the carbon/corporate integration tax shift plan comes with two important caveats. While the authors show how the overall effects on industry may be moderate, the tax shift is likely to fall regressively on consumers. A carbon tax would likely cause sharp energy price increases, which would affect low-income communities disproportionately. Unlike other ETR proposals that would cut income or payroll taxes, corporate tax integration would likely provide offsetting relief for higher energy prices to shareholders than to lower-income people.

Further, it is unclear that the levels of the carbon tax needed to balance the revenue losses from corporate tax integration would be sufficient to make a serious impact on the United States' carbon emissions, and therefore on our ability to meet the obligations of the Kyoto Protocol.

However, to the extent that business needs to be convinced that the country could introduce a carbon tax without strongly negative economic effects, corporate tax integration offers a potentially effective option for a politically feasible tax shift.

INTRODUCTION

ENVIRONMENTAL TAX REFORM IS OF INTEREST TO BOTH ACADEMIC RESEARCHERS AND policymakers. The Kyoto Protocol has focused policymakers on the need for substantial initiatives to reduce carbon emissions in the United States. Academics have responded with a variety of studies to see how taxes could be used to meet U.S. obligations under Kyoto. For example, Weyant and Hill (1999) describe a number of studies and models that evaluate taxes required to achieve Kyoto-mandated cutbacks.

Distributional concerns have long impeded progress on green tax reform. Some recent work, however, suggests that these concerns may be overstated. Previous work by Metcalf (1999) suggests that a distributionally neutral environmental tax reform would be easy to construct. Bovenberg and Goulder (2000) have pointed out that grandfathering existing carbon emissions may overcompensate industry; hence substantial revenue can be raised with a carbon tax without necessarily causing significant losses to industry.

While this paper is couched in terms of a carbon tax, an entirely equivalent policy would be a tradable permit scheme with permits initially sold by the government. The market clearing price for a given number of permits will be the same as the tax set by the government and the amount of carbon emissions in both the tax and permit systems would be the same. Note that sale of the permits is required to obtain the equivalence between a tradable permit and tax system. If the permits are given out (as was done under the SO₂ permit scheme in the Clean Air Act Amendments of 1990), then the funds necessary to pay for corporate tax integration will not be available.¹

This paper continues a long-standing interest by Redefining Progress (RP) in environmental tax shifting that began with Hamond et al. (1997). More particularly, this project is part of a research agenda on the impact of environmental tax reform on businesses. Previous work funded by RP includes Gale and Hassett (2000) and Wolff (2000). In this paper, we consider the impacts on industry of implementing a carbon tax to pay for partial corporate tax integration.

¹ To ensure comparability between a tax and permit system, the purchase of permits should be tax deductible to the same extent as an emissions tax would be. Moreover, if permit purchases are tax deductible, then permit sales should be treated as taxable income. One difference between a permit and tax scheme is that the government cannot entirely ensure a permit trading price (even under perfect certainty). For example, environmental groups could purchase permits and retire them—thereby effectively reducing the emissions quota and driving up permit prices. It is unlikely, however, that private purchases would be great enough to have a significant impact on permit clearing prices.

BACKGROUND

THE IDEA OF A CARBON TAX COMBINED with a reduction in existing taxes has been extensively studied. See, for example, Bovenberg and Goulder (1996) who consider cuts in the personal income tax financed by a carbon tax. The focus on a carbon tax is a natural one given the need to cut carbon emissions in the United States by 7 percent from 1990 levels in the years 2008-2012 (as mandated in the Kyoto Protocol).² Emissions of carbon dioxide (CO₂) in 1990 totaled 1,347 million metric tons of carbon, increasing to 1,495 million metric tons in 1998, according to the most recent report on greenhouse gas emissions from the Energy Information Administration (1999). While CO₂ emissions per dollar of GDP tended to fall in the 1990s, they are 11 percent above 1990 levels and 19 percent above the target for emissions set in the Protocol.

Thus, a substantial effort will be required to meet the target. A carbon tax is an obvious policy tool to help achieve the goals set forth in the target. A natural question is what to do with the carbon tax revenue. Research by a number of economists has indicated that reducing the tax on capital income financed by environmental tax revenues would provide the greatest efficiency gains relative to other uses of the tax revenue. Corporate tax integration is a way to reduce the tax on capital income.

Corporate tax integration is an effort to subject all income to uniform treatment under the income tax. The United States, like many countries, has a personal income tax and a corporate income tax and treats these

two taxes as separate and distinct. Thus, income earned in the corporate sector can be subject to a tax first through the corporate income tax and then through the personal income tax. Such a system leads to a number of tax-induced behaviors that can have significant efficiency impacts:

- Payout Behavior: The corporate income tax affects the decision to pay out after-tax profits in the form of dividends or to retain earnings within the corporation.
- Financing Behavior: The corporate income tax influences the decision to finance new investments with equity or debt.
- Corporate Organization: The corporate income tax affects the decision to organize businesses as corporations or partnerships.

Table 1 illustrates these distortions. It shows the amount of tax paid on a dollar of earnings from an investment for different financing, organizational, and payout assumptions.

Corporate tax integration is an effort to subject all income to uniform treatment under the income tax.

TABLE 1 TAX RATES ON MARGINAL PROFITS		
	General Tax Rate	Current Tax Rate
Corporate Dividends	$t_c + (1-t_c)t_p$	61.0%
Corporate Interest	t_p	40.0%
Corporate Retained Earnings	$t_c + (1-t_c)t_g$	39.6%
Non-Corporate Payouts	t_p	40.0%

² The Kyoto Protocol actually mandates reductions in six “greenhouse gases”: carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulphur hexafluoride. Carbon dioxide is by far the most significant of the six gases and we limit discussion to this gas. The text of the Kyoto Protocol along with explanatory documents can be found at <http://www.unfccc.de>.

³ This simplifies the analysis somewhat as we ignore various complicating factors including the alternative minimum tax, as well as the tax treatment of foreigners and tax exempt organizations. The accrual equivalent tax rate on capital gains accounts for the fact that capital gains are only taxed upon realization. Moreover, basis step-up at death further reduces the effective tax on capital gains.

The Shareholder Allocation Plan (SAP) approach retains a corporate income tax but passes all corporate income, taxes, and credits through to shareholders. In effect, the corporate income tax serves as a withholding tax.

The second column gives the general formula for the total amount of taxes paid on a dollar of pre-tax profits. There are three relevant tax rates: the corporate rate (t_c), the personal tax rate on dividends or interest income (t_p), and the accrual equivalent tax rate on capital gains (t_g).³ To give a sense of the differences in taxation, we provide numerical results using a tax rate of 35 percent for the corporate tax, 40 percent for the personal tax, and 7 percent for capital gains.

The table illustrates the various distortions. First, there is a bias against paying out dividends. Profits paid out as dividends are taxed at a rate of 61 percent while retained earnings (leading to capital gains) are only taxed at 39.6 percent. Second, there is a bias against equity financing: a dollar of profits paid out in dividends incurs roughly 1 1/2 times the level of taxes on income paid out as interest. Third, there is a bias against the corporate organizational form. Corporate profits are taxed more heavily than non-corporate profits.⁴

An extensive literature exists on the efficiency losses due to the double taxation of corporate income. A 1992 Treasury study on tax integration estimated annual efficiency gains from integration ranging from \$2.5 to \$25 billion (in 1991 dollars).

According to McLure (1979), interest in integrating the corporate and personal income tax systems increased in the 1960s and early 1970s for three reasons. First, there was widespread concern about the low rate of capital formation and it was thought that reducing the taxation of dividend income might encourage increased investment. Second, a number of European countries provided some form of dividend tax relief. Finally, a Canadian Royal Commission on Taxation report in 1967 argued that complete integration might in fact be feasible and not simply an impractical idea.

Interest in tax integration was overshadowed in the 1980s by broad-based income tax reform that culminated in the Tax Reform Act of 1986 (TRA86). Rather than fundamentally changing the tax system, TRA86 engaged in base broadening and rate lowering, reducing the top marginal tax rate on personal income from 50 to 28 percent and the top corporate tax rate from 46 to 34 percent. Moreover, as federal budget deficits grew dramatically in the 1980s, there was little interest in any tax reform that would likely lead to lower tax collections. More recently, discussion has focused on replacing the income tax with a consumption tax. It is unlikely, however, that any progress will be made towards such an extensive reform.

One of the objections to tax integration is its cost. The impetus behind this analysis is that the cost of tax integration can be paid for by revenues from a carbon tax. Such a “green tax reform” would be desirable on both environmental and efficiency grounds. Let us next turn to the mechanics of tax integration. We’ll look at two proposals in particular.⁵ First, we’ll consider full integration where corporate income is allocated to individual shareholders and subject to tax at the personal level. Second, we’ll consider dividend tax exclusion at the personal level.⁶

1. SHAREHOLDER ALLOCATION PLAN

THE SHAREHOLDER ALLOCATION PLAN (SAP) comes close to a “passthrough” (complete) integration plan that achieves all the goals of a textbook integration of the two income taxes. The SAP approach retains a corporate income tax but passes all corporate income, taxes, and credits through to shareholders. In effect, the corporate income tax serves as a withholding tax.

The first important characteristic of the SAP is that dividend income is not taxable at the personal level (since the goal of the SAP is to tax corporate income, not corporate

⁴ With these numbers, the bias goes away if all corporate after-tax profits are retained.

⁵ This section draws in part on an excellent analysis of tax integration written by the U.S. Department of the Treasury (1992) (also summarized in Hubbard (1993)).

⁶ McLure (1979) argues against this scheme and proposes instead a dividend deduction at the corporate level (similar to the interest deduction). The advantage of McLure’s approach is that corporate income is taxed at the shareholder’s tax rate rather than the corporate tax rate. It also eliminates the distortion between debt and equity financing (if basis adjustment for dividends paid is made). The 1992 Treasury report considered but rejected this approach on the grounds of cost and implementability.

distributions). To see how the SAP works, consider the following simple example. A corporation has \$100 of taxable income per share, pays \$35 in corporate taxes, and has \$65 in after-tax profits that it can either distribute to shareholders (as a dividend) or keep as retained earnings. The purpose of the SAP is to tax the shareholder on the \$100 of taxable income at the shareholder's tax rate rather than to tax income distributed as dividends or retained (and thus leading to capital gains). Let's assume for the moment that the entire \$65 of after-tax profits is paid out as a dividend. Rather than taxing dividend income, the SAP subjects the entire \$100 of corporate income to taxation at the personal level. Just as a worker receives a W-2 form from an employer detailing wages paid and taxes withheld, a shareholder would receive a "corporate W-2" detailing income earned and taxes withheld. In this example, the shareholder would report \$100 of taxable income on his personal income tax and receive a tax credit for the \$35 of taxes paid at the corporate level. For a taxpayer in the 40 percent personal income tax bracket, the gross tax liability on the corporate income is \$40 and the net tax liability (net of corporate tax payments) is \$5. The shareholder has \$60 in after-tax income available for consumption or saving—the \$65 dividend less the \$5 personal tax liability. His corporate income has been subjected to a 40% tax.

Next, assume that the corporation retains the entire \$65 in after-tax profits. Under the assumption that equity markets are efficient, the retention of \$65 should increase share value by \$65. Assuming efficient markets, the shareholder's income has gone up by \$65 (the increase in value of the shares). As in the case of distributed profits, the shareholder pays a tax on the \$100 of corporate income and receives a tax credit for the \$35 in taxes paid at the corporate level. In addition, the cost basis for the stock is increased by the amount of retained earnings so that no tax liability will be incurred on the capital gains due to these retained earnings.

To see how this works, imagine that the shareholder bought one share of stock in this corporation on Monday for \$1,000. On Tuesday, the corporation earns \$100 per share, pays taxes of \$35 per share, and retains \$65. In an efficient market, the value of the stock will increase from \$1,000 to \$1,065. On Wednesday, the shareholder sells his share for \$1,065. His selling price for purposes of calculating taxable capital gains is \$1,065. His cost basis, however, is increased from \$1,000 to \$1,065 since \$65 has been added to retained earnings. Thus, the taxable capital gain is $\$1,065 - \$1,065 = \$0$. The shareholder has received \$65 in capital gains upon sale, is subject to a net personal income tax liability of \$5 (as in the dividend case above) and so has \$60 in after-tax income. The corporate income again has been subjected to a tax of 40 percent.⁷

Table 2 shows the marginal tax on a dollar of profits under the SAP. It shows that the various distortions discussed above are eliminated under the SAP.

TABLE 2 TAX RATES ON MARGINAL PROFITS UNDER SHAREHOLDER ALLOCATION PLAN (SAP)		
	General Tax Rate	Current Tax Rate
Corporate Dividends	t_p	40.0%
Corporate Interest	t_p	40.0%
Corporate Retained Earnings	t_p	40.0%
Non-Corporate Payouts	t_p	40.0%

The shareholder allocation plan is considerably more complicated to administer than the dividend exclusion plan discussed below. Reporting and auditing burdens for corporations are likely to be significant. For example, the Treasury plan would not pass through corporate losses to shareholders but rather carry them forward at the corporate level. This is in keeping with general tax policy. In addition, change of stock ownership during a year complicates allocation of income and taxes to individuals. Since taxable income and tax liabilities are only

⁷ A simpler approach would be to simply eliminate the tax on capital gains at the personal level. There are a number of problems with this approach. For example, imagine that Bill Gates suddenly announces a special licensing arrangement with Apple Computer and, as a result, the value of Apple Computer stock increases by 15 percent. These capital gains are income that will not be subject to tax at the corporate or personal level if capital gains are no longer taxed at the personal level. Thus, the basis adjustment described in the text is a preferable method of handling retained earnings under the SAP.

measured once during the year, allocating income and share basis to shareholders must be done on a retrospective basis (and could in fact require taxpayers to file amended returns).

The 1992 Treasury study estimated that a fully phased in SAP would cost \$36.8 billion annually at 1991 income levels. This estimate has three major components. First, corporate income is taxed at the top personal tax rate rather than the corporate tax rate. Before any other adjustments, this costs \$33 billion in lost tax revenue. Second, the change in basis reduces taxes of capital gains due to retained earnings. We estimate roughly \$11.2 billion in lost tax revenue as a result of this change. Finally, tax integration is likely to lead to a shift from debt to equity finance as the tax disincentive towards equity finance is reduced. An economic analysis in the 1992 Treasury report estimates that corporate leverage falls somewhere between 1 and 7% when there is lump sum replacement of the lost tax revenues. The shift from debt to equity finance reduces interest deductions on the corporate income tax and so raises revenue to offset some of the loss on the personal tax side. We estimate this raises about \$7.4 billion in taxes. Combining these three components yields the \$36.8 billion 1991 revenue loss. Applying this methodology to 1996 data, we obtain a rough estimate of the annual revenue loss from adoption of the SAP of \$48.4 billion at 1996 income levels.

The complexity of the SAP as well as the considerable revenue loss entailed suggests that a more modest and simple integration approach might be more appropriate. Thus, we next consider the dividend exclusion approach.

2. DIVIDEND EXCLUSION PROTOTYPE

THE DIVIDEND EXCLUSION PROTOTYPE (DEP) is a simpler form of corporate tax integration that achieves partial integration of the two income taxes. Specifically, it excludes dividend income from taxation at the personal level. Thus, corporate profits paid out in dividends are only subject to the corporate income tax. The major advantage of the DEP is its simplicity and ease of implementation. Its simplicity led the Department of the Treasury to prefer this approach to any form of dividend imputation credit scheme (U.S. Department of the Treasury (1992)).

Table 3 shows the marginal tax on a dollar of profits under the DEP. This approach does not achieve complete tax integration but reduces the bias against equity finance (relative to debt finance). It also reduces but does not eliminate the bias against corporate organization.

Let us now turn to an estimate of the revenue loss under the DEP. Net corporate dividend payments totaled \$297.7 billion in 1996 in the National Income and Product Accounts (NIPA). The U.S. Treasury reported \$104.3 billion of dividends in adjusted gross income (AGI) for 1996, an amount equal to 35% of net corporate dividend payments. Table 4 (on the next page), drawn from data in Park (2000) provides a reconciliation of these two numbers.

According to Flow of Funds data, the household sector (excluding non-profits) along with mutual funds held roughly 55% of corporate equities in 1996. Thus, the first adjustment is to subtract out dividends paid to life insurance companies and pension plans (\$45.5 billion). In addition, dividends are paid to nonprofits and to fiduciaries (not distributed to individuals). Finally, dividends on stocks held in voluntary tax-deferred savings accounts (e.g. 401(k) plans) are excluded. Taxable dividends are increased by recategorizing some dividend payments deemed interest under NIPA. All told, these adjustments reduce dividends to \$149.7 billion leaving a discrepancy of \$45.4 billion between NIPA estimates of dividends in AGI and IRS amounts. This discrepancy can likely

The Dividend Exclusion Plan (DEP) excludes dividend income from taxation at the personal level. Corporate profits paid out in dividends are only subject to the corporate income tax. The major advantage of the DEP is its simplicity and ease of implementation.

TABLE 3 TAX RATES ON MARGINAL PROFITS UNDER DIVIDEND EXCLUSION PROTOTYPE (DEP)		
	General Tax Rate	Current Tax Rate
Corporate Dividends	t_c	35.0%
Corporate Interest	t_p	40.0%
Corporate Retained Earnings	$t_c + (1-t_c)t_g$	39.6%
Non-Corporate Payouts	t_p	40.0%

TABLE 4**RECONCILIATION OF NIPA AND IRS DIVIDEND DATA**

Category	Amount (billions)
NIPA Dividends	\$297.4
Less dividends received by:	
<i>life insurance carriers and pension plans</i>	<i>45.5</i>
<i>nonprofits or fiduciaries</i>	<i>20.8</i>
<i>other exempt entities</i>	<i>103.5</i>
Plus:	
<i>dividends categorized as interest in NIPA accounts</i>	<i>38.4</i>
<i>BEA-derived dividends in AGI</i>	<i>149.7</i>
<i>IRS dividends in AGI</i>	<i>104.3</i>
Unexplained difference	45.4

SOURCE: PARK (2000), TABLE 1.

be explained by differences among equity owners in their holdings of stocks. If individuals tend to hold disproportionate amounts of non-dividend paying stocks (relative to private pension funds and insurance companies), then the low amount of dividends in AGI can be reconciled with the corporate dividend payment aggregates calculated by BEA.

As a rough guide to the revenue cost of excluding dividends from taxable income in the personal income tax, we can use an estimate of the average marginal income tax rate on dividend income constructed from the NBER's TAXSIM tax calculator (Feenberg (2000)). This average tax rate in 1996 was 28.9%. Excluding dividends from taxable income would lead to a revenue loss of \$30.1 billion ($=.289 \times \104.3 billion) for that year. A few adjustments to this calculation are required to obtain a more accurate measure. First, as noted above, tax integration is likely to lead to a shift from debt to equity finance as the tax disadvantage towards equity finance is reduced. Second, there are a number of smaller changes including a reallocation of physical capital from the household, noncorporate and state/local government sectors to the corporate sector, as well as changes in the equilibrium interest rate and dividend payout rates. Taking these considerations into account, we estimate that the revenue loss falls to \$31.2 billion per year.

We will consider the following two DEP proposals:

1. Exclusion of all dividends from personal income tax financed by a carbon tax. Based on the calculation above, this would require a carbon tax of \$31.2 billion per year.

It is worth pausing to consider which industries benefit the most from tax integration. There are no data available on distribution of corporate equity holdings by industry across equity owners. We will assume that households hold equities by industry in proportion to dividend payouts by industry. Table 5 shows the top 10 industries in terms of net corporate dividend payments. These ten industries account for over half of dividend payments in 1996 and are likely to be the greatest beneficiaries of tax integration.

Conversely, we can identify those industries that are affected most heavily by a carbon tax. Given the significant impact on these industries, we consider a second policy option:

2. Exclusion of 100% of dividends from personal income tax from industries most heavily affected by a carbon tax combined with 50 percent exclusion for all other industries.

TABLE 5**TOP 10 CORPORATE DIVIDEND PAYING INDUSTRIES**

INDUSTRY	\$BILLIONS
Finance	28.6
Communications, except radio and TV	20.9
Utilities	19.0
Retail trade	16.9
Chemicals and other products	16.3
Wholesale trade	15.4
Food and kindred products	14.8
Insurance	13.9
Business services	10.3
Real estate	8.4

SOURCE: NIPA DATA

MODELING APPROACH AND ANALYSIS

A NUMBER OF ECONOMISTS HAVE STUDIED the economic consequences arising from corporate tax integration. The most common approach is to use a computable general equilibrium (CGE) model. Such models have been used by Ballard et al. (1985), Fullerton et al. (1981), and the U.S. Department of the Treasury (1992) to analyze the impact of corporate tax integration. CGE models are typically large, complex structural models of an economy derived from fundamental economic theory. Their strengths are their logical consistency, as well as their usefulness for policy and counterfactual analysis. Their very complexity, however, makes them difficult to evaluate from the outside, and deeply embedded assumptions and modeling approaches often play an important role in driving results in ways that are not obvious to the casual observer.

Rather than employ a CGE model, we undertake an analysis that uses behavioral response estimates from CGE modeling and other empirical analyses. We focus on three major changes: shifts in the allocation of capital, changes in the sources of funding for capital projects, and changes in uses of funds from capital projects.

The first critical behavioral response arising from corporate tax integration is a shift in the allocation of capital. Integrating the corporate and personal income tax will reduce the effective tax rate on corporate capital. This in turn leads to a shift in capital from the non-corporate to the corporate sector. In particular, capital flows from the household, government, and noncorporate sector to the corporate sector. This will lead to an increase in corporate taxes and a decrease in personal taxes as taxable profits shift from the noncorporate sector (as well as the nontaxable sectors) to the corporate sector.

The second critical behavioral response is a change in corporate leverage structure. Corporate tax integration removes (or reduces) the advantage to debt financing (relative to equity financing). Thus, we expect less debt financing and more equity financing. We calculate the change based on empirical estimates of the impact of taxes on financing structure from Graham (1999). Shifts from debt to equity financing affect tax collections in three ways: 1) they reduce corporate interest deductions and so increase corporate tax collections; 2) they reduce interest income taxable at the personal level; and 3), they increase retained earnings (to the extent that equity related profits are retained rather than distributed). These retained earnings will be taxed at the personal level upon realization of the capital gains associated with the earnings.

The third critical behavioral response is a change in dividend payout behavior. Changes in dividend payout behavior will have little impact on the revenue estimates. After tax integration effectively eliminates taxation of dividends, payout behavior only affects tax collections to the extent that capital gains are taxed. As discussed below, on an accrual basis, capital gains are taxed quite lightly and so changes in their tax treatment have only a minimal impact on tax collections.

SHAREHOLDER ALLOCATION PROTOTYPE

WE BEGIN WITH AN ANALYSIS OF THE Shareholder Allocation Prototype (SAP). As noted above, the SAP treats corporate income in a similar fashion to partnership income. The corporate income tax continues to operate in its present fashion but should now be properly viewed as a withholding tax. Corporate income and corporate tax payments are attributed to individual shareholders who report the

income on the personal income tax and take credits for any taxes paid at the corporate level.

We first note the assumptions that we make about the three types of behavioral changes we expect after tax reform. First, there is the shift in capital from the non-corporate to the corporate sector. Based on the analysis in the Treasury study, we assume a shift in capital (as a fraction of total capital) towards the corporate sector of 2.8 percentage points. As *Table 6* demonstrates, this implies an increase in corporate capital of 10.2 percent.

TABLE 6 DISTRIBUTION OF CAPITAL STOCK				
Sector	Capital Stock 1996 levels	Share of Total Capital Stock	Shift in Total Capital Stock	Percentage Change in Capital Stock
Corporate	6,494	27.4%	2.80%	10.2%
Noncorporate	2,033	8.6%	-0.30%	-3.5%
Government	4,725	19.9%	-0.10%	-0.5%
Household	10,454	44.1%	-2.40%	-5.4%
Total	23,706	100%		
<i>SOURCE: Herman (2000) and authors' calculations</i>				

What impact this shift will have on taxable income in the corporate sector is unclear. One thought might be that taxable profits will increase at the same rate as does the capital stock (assuming constant returns to scale in production and a scaling up of all other inputs in production at the same rate as capital). This overstates the growth in taxable profits for two reasons. First, a change in relative prices (decrease in cost of capital) will lead to an increase in the use of the favored factor greater than any increase in other factors. On this basis alone, the growth in output would be likely to be on the order of 1/4 to 1/3 the growth in capital. Second, this view ignores the impact of the decline in the housing sector on production in the economy. Demand for durable goods, construction, and other industry outputs would fall as capital shifts out of residential housing. We take these two considerations into account as follows: First, we report detailed industry impacts assuming no change in corporate output. Then, we show how the aggregate revenue estimates are affected by increases in corporate output. The

distribution across sectors of price changes is not appreciably affected by changes in output and so our understanding of the relative industry impacts is not affected.

The second behavioral response is a change in the source of funds for corporate investment. To calculate this change, we use results from Graham (1999). Graham regresses the debt to value ratio on a number of variables including the personal tax preference for equity, $P = t_p \cdot (1 - t_c) / t_e$, where t_p is the tax rate on dividend and interest income, t_c is the corporate tax rate and t_e is the tax rate on equity. The estimated change in the debt to value ratio will be $b(P_1 - P_0)$ where b is the estimated coefficient on the personal tax preference for equity variable in Graham's regression, and $(P_1 - P_0)$ is the change in the value of this variable following tax integration.

The tax rate on equity is a weighted average of the tax rate on dividend income and the accrual equivalent tax rate on capital gains (weighted by the dividend payout ratio). Following Graham (1999), Gordon and Mackie-Mason (1990), and Feldstein et al. (1983), we reduce the statutory rate on capital gains by 75 percent to convert to an accrual equivalent. This is a conventional assumption based on half the taxes being foregone through deferral and half again from basis step-up at death. Given a top tax rate on capital gains of 28 percent, the accrual equivalent tax rate on capital gains is 7 percent. The pre-tax reform tax on equity equals $(.59)(.289) + (.41)(.07) = .199$ where the dividend payout ratio for 1996 was 59% and the average marginal tax on dividends is 28.9 percent. Thus the tax preference variable (P_0) equals $.396 - (1 - .35)(.199)$ or .267. The Shareholder Allocation Prototype drives the tax preference variable to zero ($P_1 = 0$). Based on Graham's preferred regression and coefficient estimate of -0.219, this reduces the leverage ratio by 5.8 percentage points.

Finally, we assume a 4.3 percent increase in the dividend payout ratio. It turns out that this parameter has little impact on the results. Since dividends are no longer taxed at the personal level and the accrual equivalent tax rate on capital gains is only 7 percent, the change in tax collections is minor relative to other changes.

We begin by reporting summary results on aggregate changes in taxation resulting from the SAP in *Table 7*.

The row labeled “Rest of the world” represents tax revenues on earnings from foreign corporations owned by domestic taxpayers. The SAP loses \$8.8 billion in personal income taxes that do not benefit owners of domestic firms. See *Appendix Table A1* for a detailed breakdown of the revenue losses.

We next turn to the analysis of carbon taxes and the overall impact of the tax reform on industry prices. To finance corporate tax integration, we impose a carbon tax designed to raise \$44.7 billion in 1996. As noted above, carbon emissions totaled 1,460.5 million metric tons of carbon in 1996 (Energy Information Administration (1999)). Assuming no change in emissions, a carbon tax of \$30.61 per metric ton of carbon would be necessary to raise \$44.7 billion. Carbon emissions break down is included in *Table 8*.

We now have all the information needed to determine the direct impact of the tax reform. All we need to do is offset the tax reductions in *Appendix Table A1* with tax increases of \$15.96 billion for the coal mining industry and \$28.74 billion for the oil and gas extraction industries. This approach, however, ignores the indirect impacts of the taxes as prices change in the economy. We turn to that analysis now.

The conventional view of the incidence of carbon taxes is that they will be passed forward in the form of higher product prices to consumers. The input-output analysis makes that assumption and translates the intermediate goods taxes into higher industry prices as energy intensive inputs (now more expensive) are used in the production of downstream goods. Corporate tax integration, by reducing the double taxation of capital income, should increase the income of owners of all capital (corporate and non-corporate). This result was first shown by Harberger (1962) and this incidence assumption is frequently used (see, for example, Pechman (1985)). It is possible that in the context of a package reform where corporate tax integration is combined with a carbon tax, the entire package of taxes is passed forward in changes in prices of industry

TABLE 7			
SAP REVENUE LOSSES (\$BILLIONS)			
	Change in Corporate Tax	Personal Tax	Total
Domestic	11.5	-47.4	-35.9
Rest of the world	0.0	-8.8	-8.8
Total	11.5	-56.2	-44.7
<i>SOURCE: Authors' calculations</i>			

products. This follows as the higher prices of goods (due to the carbon tax) put domestic goods at a competitive disadvantage relative to imported goods. This competitive force makes it difficult for owners of capital to appropriate the gains from corporate tax reductions.

If this argument is correct, then the price changes we report below can be viewed as a measure of the industry incidence impact of

TABLE 8			
CARBON EMISSIONS IN 1996			
Fuel Source	Emissions (mmtc)	Fraction of Total	Revenue (\$bill)
Coal	521.8	35.7%	\$15.96
Natural gas	320.0	21.9%	\$9.79
Petroleum	618.7	42.4%	\$18.95
Total	1,460.5	100%	\$44.70

the tax reform. Alternatively, it may be that the conventional story continues to hold and that the carbon tax is passed forward into higher prices while the corporate tax integration tax reductions accrue to owners of capital (are passed backward). Rather than attempt to determine the ultimate incidence of this complex reform, we take a different tack. We report a statistic that we call the Breakeven Incidence Share (BIS). The BIS represents what fraction of the carbon tax incidence must fall on shareholders to offset the gains from corporate tax integration (assuming all benefits from integration accrue to shareholders). For example, if an industry experiences a price increase of 4 percent due to the carbon tax and the equivalent of a 0.4 percent decrease due to corporate tax integration, then the BIS is 10 percent. In other words, so long as no more than 10 percent of the carbon tax is shifted back to capital owners and the full benefits of corporate tax integration accrue to sharehold-

The Breakeven Incidence Share (BIS) represents what fraction of the carbon tax incidence must fall on shareholders to offset the gains from corporate tax integration (assuming all benefits from integration accrue to shareholders).

ers, the benefits of tax integration exceed the costs of the carbon tax from the perspective of capital owners. A lower BIS therefore indicates a greater need for an industry to pass the carbon tax on to consumers in order to break even from the tax shift.

First, we show the price impacts resulting from corporate tax integration. As noted above, these are the price impacts under the assumption that the tax reductions are passed forward to consumers. We are not arguing that this in fact will happen; this allows us to present the tax changes in a way that allows comparison with the carbon tax price changes.

TABLE 9 PRICE CHANGES DUE TO SAP	
<i>Greatest Declines in Price Due to SAP</i>	
INDUSTRY	PRICE CHANGE
Finance	-1.98%
Insurance	-1.61%
Communications, except radio and TV	-1.14%
Other transportation equipment	-0.99%
Chemicals & other products	-0.88%
<i>Smallest Declines in Price Due to SAP</i>	
INDUSTRY	PRICE CHANGE
Radio and TV broadcasting	0.55%
Government & other	-0.04%
Tobacco products	-0.12%
Real estate	-0.16%
Automotive repair and services	-0.16%

Not surprisingly, four of the five industries with the greatest price declines are included in the list of top corporate dividend paying industries (Table 5). The dispersion of price changes is moderate and in all cases negative except for radio and TV broadcasting. This sector pays little in dividends and so gains little on the personal income tax side from the elimination of dividend taxation. The small gains on the personal side are more than offset by losses on the corporate side. The price changes arising from the SAP are of

a comparable magnitude to the dispersion of price changes due to the carbon tax (except for three industries) as the next table shows:

TABLE 10 PRICE CHANGES DUE TO CARBON TAX	
<i>Greatest Increases in Price Due to Carbon Tax</i>	
INDUSTRY	PRICE CHANGE
Petroleum refining and related products	12.76%
Coal mining	10.35%
Utilities	7.19%
Primary metal industries	1.62%
Nonmetallic minerals mining	1.25%
<i>Smallest Increases in Price Due to Carbon Tax</i>	
INDUSTRY	PRICE CHANGE
Insurance	0.10%
Real estate	0.11%
Business services	0.13%
Finance	0.14%
Communications, except radio and TV	0.16%

Petroleum refining, coal mining, and utilities suffer very large price increases relative to other industries (and relative to the price decreases from SAP). Combining the two price changes, we can see that the rankings are largely driven by the carbon tax increases:

TABLE 11 TOTAL CHANGES IN PRICES DUE TO TAX REFORM	
<i>Greatest Increases in Price</i>	
INDUSTRY	PRICE CHANGE
Petroleum refining and related products	11.94%
Coal mining	9.87%
Utilities	6.41%
Primary metal industries	1.21%
Metallic ores mining	0.90%
<i>(continued on next page)</i>	

TABLE 11 (CONTINUED)
TOTAL CHANGES IN PRICES
DUE TO TAX REFORM

Greatest Decreases in Price

INDUSTRY	PRICE CHANGE
Finance	-1.84%
Insurance	-1.51%
Communications, except radio and TV	-0.98%
Other transportation equipment	-0.58%
Pipelines, freight forwarders, and related services	-0.39%

Complete results for all sectors are presented in the appendix. Of the 50 industries analyzed, 29 have a positive net price change while 21 have a negative price change. Once we get past the three industries most affected by the carbon tax, the price changes range from -1.84 to 1.21 percent, a relatively moderate range.

Comparing these two price changes is only appropriate if the reduction in capital income taxation is passed forward to consumers in the form of lower prices (or if the carbon tax is passed back to capital owners in the form of lower returns). We next report our measure of the required amount of pass-back in the carbon tax possible before equity holders are adversely affected by this reform. We report it for the ten industries with the highest net price increase.

So long as less than 6.4 percent of the carbon tax is passed back to equity holders in the petroleum refining and related products industry, returns to shareholders will not fall

following this green tax reform⁸. A negative measure of the BIS means that equity returns fall even with zero pass back of the carbon tax. Among these ten industries, coal mining has the lowest BIS measure (4.6%) and nonmetallic minerals mining has the highest (46.4%). Table 12 also shows the impact on consumer prices if the benefits of the SAP are passed forward (along with the carbon tax) to consumers. The column labeled “Sum” provides the consumer price increases under full forward passing of both taxes.

Another way to present the information in the BIS is to report which industries are harmed under various amounts of backward shifting of the carbon tax. Table 13 outlines these results.

TABLE 13
INDUSTRIES ADVERSELY IMPACTED BY VARIOUS DEGREES OF
CARBON TAX BACKWARD SHIFTING

10 percent shift

Radio and TV broadcasting, coal mining, petroleum refining and related products

20 percent shift

Radio and TV broadcasting, coal mining, petroleum refining and related products, utilities, government & other, metallic ores mining

30 percent shift

Radio and TV broadcasting, coal mining, petroleum refining and related products, utilities, government & other, metallic ores mining, primary metal industries

40 percent shift

Radio and TV broadcasting, coal mining, petroleum refining and related products, utilities, government & other, metallic ores mining, primary metal industries, air transportation

50 percent shift

Radio and TV broadcasting, coal mining, petroleum refining and related products, utilities, government & other, metallic ores mining, primary metal industries, air transportation, motor freight transportation and warehousing, stone, clay and glass, nonmetallic minerals mining

TABLE 12
BREAKEVEN INCIDENCE SHARES

Industry	Carbon Tax	SAP	Sum	BIS
Petroleum refining and related products	12.76%	-0.82%	11.94%	6.4%
Coal mining	10.35%	-0.48%	9.87%	4.6%
Utilities	7.19%	-0.78%	6.41%	10.8%
Primary metal industries	1.62%	-0.41%	1.21%	25.3%
Metallic ores mining	1.08%	-0.18%	0.90%	16.7%
Radio and TV broadcasting	0.30%	0.55%	0.85%	-183.3%
Air transportation	1.20%	-0.38%	0.82%	31.7%
Nonmetallic minerals mining	1.25%	-0.58%	0.67%	46.4%
Stone, clay and glass	1.10%	-0.49%	0.61%	44.5%
Motor freight transportation and warehousing	0.93%	-0.38%	0.55%	40.9%

Of the 50 industries analyzed, 30 pay more in carbon taxes than they receive in tax reductions, six are essentially unaffected, and 24 benefit from the tax reform. What is striking, however, is that once we get past the top three industries, the price changes are quite modest, not exceeding 1 percent in absolute value.

Summing up, the SAP financed by a carbon tax blunts to a modest degree the price increases that arise from the carbon tax. If the carbon tax is fully passed forward to consumers, then the tax reform benefits the owners of equity in nearly all industry sectors.

This is worth emphasizing. The standard incidence view is that a carbon tax would be passed forward to consumers in the form of higher product prices while capital tax reductions would be passed back to owners of capital. If this view is correct, business (or, more precisely, the equity holders) would generally benefit from corporate tax integration financed by a modest carbon tax.

The SAP above is estimated to cost nearly \$45 billion a year. That is based on no growth in corporate profits (and corporate taxes, other than changes resulting from changes in financial policy). If production were Cobb-Douglas with a capital output elasticity of .25, then a 10.2 percent increase in capital would bring about a 2.5 percent increase in output. The decrease in capital use in other sectors would have a spillover effect on the corporate sector as described above. Rather than try to estimate the growth in taxable corporate profits, we present some revenue estimates for different growth assumptions.⁹

As the growth rate of corporate profits increases, so do corporate income tax collections. This is offset by a slight decrease in personal income tax collections as corporate income is now taxed at a lower average rate, and non-corporate income falls. Tax collections fall by 20 percent over a reasonable range of growth rates.

The good news is that growth in corporate revenues arising from the shift in capital reduces the need for a substantial carbon tax. A carbon tax raising only \$35 to \$45 billion a year would not bring about the reductions in carbon use called for in the Kyoto Protocol. Still, a carbon tax of this magnitude would have considerably less of an impact on the economy, and would allow for learning about the efficiency and distributional impacts of a carbon tax if it were decided in the future to increase reliance on this tax to effect a substantial reduction in carbon emissions.

DIVIDEND EXCLUSION PROTOTYPE

THE NEXT ANALYSIS THAT WE CONSIDER IS THE dividend exclusion prototype (DEP) discussed above. Put simply, dividends are no longer taxable at the personal level. Our assumptions about financial behavior are the same as in the previous section. The shift away from debt is blunted a bit, however, as this prototype only achieves partial tax integration.

Again, note that the pre-tax reform tax on equity equals $(.59)(.289) + (.41)(.07) = .199$ where the dividend payout ratio for 1996 was 59% and the average marginal tax on dividends is 28.9 percent. Excluding dividends from taxable income at the personal level reduces the tax on equity from 19.9 percent to 2.9 percent. Based on Graham's preferred regression, this reduces the leverage ratio by 2.4 percentage points.

Table 15 presents summary results on the changes in taxation resulting from the DEP.

First, we show the price impacts resulting from corporate tax integration. Table 16 lists the five industries with the lowest price declines and the five with the highest price

TABLE 14

SAP REVENUE ESTIMATES

Growth Rate of Corporate Profits	Change in Corporate Income Tax	Change in Personal Income Tax	Change in Total Taxes
0.0%	11.5	-56.2	-44.7
1.5%	14.6	-56.3	-41.7
3.0%	17.7	-56.5	-38.7
4.5%	20.8	-56.6	-35.7

TABLE 15

DEP REVENUE LOSSES (\$BILLIONS)

	Change in Corporate Tax	Change in Personal Tax	Total
Domestic	4.8	-28.8	-24.0
Rest of the world	0.0	-7.2	-7.2
Total	4.8	-36.0	-31.2

Source: Authors' calculations

⁹ We assume a similar growth rate for non-corporate output based on the change in non-corporate capital.

declines (complete results are in Appendix Table A3). The price changes are relatively modest. (Tobacco represents a special case. It had negative net corporate dividends; we need to do further analysis of the correct way to treat this industry.)

The benefits from corporate tax integration are fairly evenly distributed across industry groups, as the greatest benefit is a 1 percent decrease in price (for the finance industry). In contrast, the costs of the carbon tax are highly concentrated as *Table 17* shows.

Three industries face price increases of more than 4 percent, while the remainder face price increases of roughly one percent.

We next turn to the combined effects of the overall tax reform. *Table 18* shows the five industries with the largest gains and losses from the tax reform expressed as a percentage change in price.

A list of price changes for all industries is included in the appendix. Of the 50 industries analyzed, 30 pay more in carbon taxes than they receive in tax reductions, six are essentially unaffected, and 24 benefit from the tax reform. What is striking, however, is that once we get past the top three industries, the price changes are quite modest, not exceeding 1 percent in absolute value.

On the next page in *Table 19*, we once again report the BIS statistic for the industries with the highest net price increase.

The BIS threshold for petroleum refining is lower than under the SAP reform while coal mining is roughly the same. Tobacco products face higher taxes under both the carbon tax and the DEP, and so the BIS is not especially meaningful for this industry.

We can reduce the impact on the top three carbon-intensive industries somewhat by giving preferential dividend exclusion treatment to these industries relative to the remaining sectors. For example, *Table 20* (on the next page) illustrates the price impacts from excluding all dividends from personal income taxation for the petroleum refining, coal

TABLE 16

CORPORATE TAX INTEGRATION: DEP

Industry	DEP
<i>Least Benefit from Corporate Tax Integration</i>	
Tobacco products	0.18%
Government & other	-0.03%
Real estate	-0.13%
Automotive repair and services	-0.14%
Industrial machinery & other equipment	-0.15%
<i>Greatest Benefit from Corporate Tax Integration</i>	
Finance	-1.05%
Insurance	-1.00%
Communications, except radio and TV	-0.89%
Chemicals & other products	-0.70%
Utilities	-0.60%

TABLE 17

CARBON TAX PRICE INCREASES

Industry	Carbon Tax
<i>Highest Price Increases</i>	
Petroleum refining and related products	8.89%
Coal mining	7.02%
Utilities	4.93%
Primary metal industries	1.10%
Nonmetallic minerals mining	0.86%
<i>Lowest Price Increases</i>	
Insurance	0.07%
Real estate	0.08%
Finance	0.09%
Business services	0.09%
Communications, except radio and TV	0.11%

TABLE 18

DIRECT AND INDIRECT EFFECTS OF GREEN TAX REFORM

Industry	Carbon Tax	DEP	Sum
<i>Highest Price Increases</i>			
Petroleum refining and related products	8.89%	-0.45%	8.44%
Coal mining	7.02%	-0.35%	6.67%
Utilities	4.93%	-0.60%	4.33%
Primary metal industries	1.10%	-0.28%	0.82%
Air transportation	0.84%	-0.19%	0.65%
<i>Highest Price Decreases</i>			
Finance	0.09%	-1.05%	-0.96%
Insurance	0.07%	-1.00%	-0.93%
Communications, except radio and TV	0.11%	-0.89%	-0.78%
Pipelines, freight forwarders, and related services	0.18%	-0.55%	-0.37%
Printing and publishing	0.22%	-0.49%	-0.27%

TABLE 19**BREAKEVEN INCIDENCE SHARES**

Industry	Carbon Tax	DEP	Sum	BIS
Petroleum refining and related products	8.89%	-0.45%	8.44%	5.1%
Coal mining	7.02%	-0.35%	6.67%	5.0%
Utilities	4.93%	-0.60%	4.33%	12.2%
Primary metal industries	1.10%	-0.28%	0.82%	25.5%
Air transportation	0.84%	-0.19%	0.65%	22.6%
Stone, clay and glass	0.75%	-0.32%	0.43%	42.7%
Motor freight transportation and warehousing	0.65%	-0.26%	0.39%	40.0%
Nonmetallic minerals mining	0.86%	-0.49%	0.37%	57.0%
Tobacco products	0.16%	0.18%	0.34%	-112.5%
Metallic ores mining	0.75%	-0.50%	0.25%	66.7%

TABLE 20**DIRECT AND INDIRECT EFFECTS OF GREEN TAX REFORM:
PREFERENTIAL TREATMENT FOR HEAVILY IMPACTED INDUSTRIES**

Industry	Carbon Tax	DEP	Sum	BIS
Highest Price Increases				
Petroleum refining and related products	5.04%	-0.37%	4.67%	7.3%
Coal mining	3.88%	-0.30%	3.58%	7.7%
Utilities	2.75%	-0.61%	2.14%	22.2%
Primary metal industries	0.61%	-0.17%	0.44%	27.9%
Air transportation	0.47%	-0.12%	0.35%	25.5%
Highest Price Decreases				
Finance	0.05%	-0.55%	-0.50%	1100.0%
Insurance	0.04%	-0.51%	-0.47%	1275.0%
Communications, except radio and TV	0.06%	-0.46%	-0.40%	766.7%
Pipelines, freight forwarders, and related services	0.10%	-0.29%	-0.19%	290.0%
Printing and publishing	0.12%	-0.26%	-0.14%	216.7%

TABLE 21**DEP REVENUE ESTIMATES**

Growth Rate of Corporate Profits	Change in Corporate Income Tax	Change in Personal Income Tax	Change in Total Taxes
0.0%	4.8	-36.0	-31.2
1.5%	7.9	-36.3	-28.5
3.0%	11.0	-36.7	-25.7
4.5%	14.1	-37.0	-23.0

mining and utility industries while excluding 50 percent of dividends for remaining industries.

While this preferential treatment reduces the price impact for these three industries (and raises the BIS), they still face sharply higher prices relative to other sectors. Moreover, the amount required to be raised by a carbon tax is reduced from \$31.5 billion to \$17.8 billion. The cost of reducing the inter-industry impacts is a reduced need for carbon tax revenues and impetus for reductions in carbon use.

Finally, we report alternative revenue estimates assuming different growth rates for corporate profits in *Table 21*.

Tax revenues fall about 25 percent when corporate profits rise by 4.5 percent relative to the no growth scenario (a fall of \$23 billion as opposed to \$31.2 billion).

CONCLUSION

A CARBON TAX IS PERHAPS THE MOST effective policy tool that the United States can employ to achieve the carbon reductions required by the Kyoto Protocol. Building support for such a tax has been difficult, in part because there has not been a clear discussion of how the revenues from a carbon tax would be used. We argue in this paper that a carbon tax used to finance corporate tax integration could have beneficial efficiency effects. Moreover, the industry impacts are likely to be modest (in the sense of returns to shareholders). Put differently, there is little need to provide substantial additional relief to particular industry sectors in the economy to hold them harmless in the reform.

We close with two additional comments about a carbon tax linked to corporate tax integration.

First, the revenue required of a carbon tax to offset revenue losses from tax integration is relatively modest, and the carbon tax would certainly fall short of levels required to achieve compliance with the Kyoto Protocol. This proposal could be viewed as a first step towards a serious carbon tax, whereby the U.S. gains experience with this new tax before committing to more substantial levels of carbon taxation.

Second, our focus in this paper on industry level distribution of taxes is somewhat unusual and is of interest more from a political economy perspective than a traditional tax incidence perspective. Our focus is dictated by our interest in linking a carbon tax with a tax that would increase economic efficiency. Reductions in capital income taxation are generally held to be more efficient than other types of tax reductions. Corporate tax integration has the added benefit of combining reductions in capital

income taxation with an equalizing of tax treatment across various forms of capital.

This focus on efficiency comes at the cost of a likely reduction in overall progressivity in the tax code under this proposed reform. As one of us has noted in previous work (Metcalf (1999)), it is difficult—if not impossible—to improve efficiency and progressivity in a green tax swap involving a carbon tax and some other tax. Whether policymakers choose to emphasize progressivity or efficiency in crafting a green tax reform with a carbon tax is something we cannot predict.

What we have shown in this paper, however, is that it may be possible to develop a coalition of environmental and business groups to support a carbon tax in the United States and that when combined with corporate tax integration, this tax could enhance efficiency while moving the United States into the small but growing camp of countries that have enacted carbon taxes in the past ten years.

We argue in this paper that a carbon tax used to finance corporate tax integration could have beneficial efficiency effects. Moreover, the industry impacts are likely to be modest (in the sense of returns to shareholders).

APPENDIX A: INPUT-OUTPUT ANALYSIS

THE INPUT-OUTPUT ACCOUNTS TRACE THE production of commodities by industries and the use of those commodities by other industries. Taken together, one can trace the use of inputs produced by one industry and used by all other industries. Adding up various identities along with assumptions about production and trade allow the accounts to be manipulated to trace through the impact of price changes in one industry on the products of all other industries in the economy. A brief description of the use of the input-output accounts follows.¹⁰

Tracing price changes through the economy on the basis of input-output accounts dates back to work by Leontief (documented in Leontief (1986)). The model makes a number of important assumptions, the most important of which are 1) goods are produced and sold in a perfectly competitive environment such that all factor price increases are passed forward to consumers, 2) domestic and foreign goods are sufficiently different that the price of domestic goods can adjust following changes in factor prices,¹¹ and 3) input coefficients a_{ij} (the amount of industry i used in the production of industry j) are constant. Thus, input substitution is not allowed as factor prices change. This last assumption means that price responses are only approximate, as they don't allow for product mix changes as relative prices change. In effect, the input-output accounts can be used to trace first order price effects through the economy.

Two sets of equations define the basic input-output accounts. The first set relates the demand for goods from an industry to the value of output from that industry:

$$(B1)$$

$$\begin{aligned} x_{11}p_1 + x_{12}p_1 + \dots + x_{1N}p_1 + d_1p_1 &= x_1p_1 \\ x_{21}p_2 + x_{22}p_2 + \dots + x_{2N}p_2 + d_2p_2 &= x_2p_2 \\ &\vdots \\ x_{N1}p_N + x_{N2}p_N + \dots + x_{NN}p_N + d_Np_N &= x_Np_N \end{aligned}$$

where x_{ij} is the quantity of the output from industry i used by industry j , p_i is the unit price of product i , d_i is the final demand for output i , and x_i is the total output of industry i . These N equations simply say that the value of output from each industry must equal the sum of the value of output used by other industries (intermediate inputs), plus final demand. Without loss of generality, we can choose units for each of the goods so that all prices equal 1. This will be convenient as the expenditure data in the input-output accounts can then be used to measure quantities prior to any taxes that we will impose.

The second set of equations relates the value of all inputs and value added to the value of output:

$$(B2)$$

$$\begin{aligned} x_{11}p_1 + x_{21}p_2 + \dots + x_{N1}p_N + v_1 &= x_1p_1 \\ x_{12}p_1 + x_{22}p_2 + \dots + x_{N2}p_N + v_2 &= x_2p_2 \\ &\vdots \\ x_{1N}p_1 + x_{2N}p_2 + \dots + x_{NN}p_N + v_N &= x_Np_N \end{aligned}$$

where v_i is value added in industry i . Define $a_{ij} = x_{ij}/x_j$, the input of product i as a fraction of the total output of industry j . The system (B2) can be rewritten as

¹⁰ This discussion is based on Metcalf (1999).

¹¹ Fullerton (1996) terms this the Armington assumption following work by Armington (1969).

$$\begin{aligned}
(B3) \quad & (1-a_{11})p_1 - a_{21}p_2 - \dots - a_{N1}p_N = v_1/x_1 \\
& -a_{12}p_1 + (1-a_{22})p_2 - \dots - a_{N2}p_N = v_2/x_2 \\
& \quad \quad \quad \cdot \\
& \quad \quad \quad \cdot \\
& \quad \quad \quad \cdot \\
& -a_{1N}p_1 - a_{2N}p_2 - \dots + (1-a_{NN})p_N = v_N/x_N
\end{aligned}$$

These equations can be expressed in matrix notation as

$$(B3') \quad (I - A')P_1 = V$$

where I is an $N \times N$ identity matrix, A is an $N \times N$ matrix with elements a_{ij} , P_1 is an $N \times 1$ vector of industry prices, p_i , and V is the $N \times 1$ vector whose i^{th} element is v_i/x_i . Assuming that $(I-A')$ is non-singular, this system can be solved for the price vector:

$$(B4) \quad P_1 = (I-A')^{-1}V.$$

With the unit convention chosen above, P_1 will be a vector of ones. However, we can add taxes to the system, in which case the price vector will now differ from a vector of ones as intermediate goods taxes get transmitted through the system. Specifically, let t_{ij} be a unit tax on the use of product i by industry j . In this case, the value of goods used in production (grossed up by their tax) plus value added now equals the value of output:

$$\begin{aligned}
(B5) \quad & x_{11}p_1(1+t_{11}) + x_{21}p_2(1+t_{21}) + \dots + x_{N1}p_N(1+t_{N1}) + v_1 = x_1p_1 \\
& x_{12}p_1(1+t_{12}) + x_{22}p_2(1+t_{22}) + \dots + x_{N2}p_N(1+t_{N2}) + v_2 = x_2p_2 \\
& \quad \quad \quad \cdot \\
& \quad \quad \quad \cdot \\
& \quad \quad \quad \cdot \\
& x_{1N}p_1(1+t_{1N}) + x_{2N}p_2(1+t_{2N}) + \dots + x_{NN}p_N(1+t_{NN}) + v_N = x_Np_N
\end{aligned}$$

This set of equations can be manipulated in a similar fashion to the equations above to solve for the price vector:

$$(B6) \quad P_1 = (I - B')V$$

where B is an $N \times N$ matrix with elements $(1+t_{ij})a_{ij}$.

We regrouped industries in the input-output accounts into 50 industry groupings. Tax rates are computed as the ratio of required tax revenue from the industry divided by the value of output from that industry. Imagine that a carbon tax is designed to collect \$20 billion on coal. The

tax rate applied to the coal industry then equals

$$t_{4.} = \frac{20}{\sum_{j=1}^N x_{4j}} \quad t_{4.} = \frac{20}{\sum_{j=1}^N x_{4j}}$$

where the tax is designed to collect \$20 billion from the coal industry (industry 4). This tax is applied to all variables in the fourth equation of B5. Other industry level taxes are computed in a similar fashion. Some taxes only apply to the output of certain industries used by certain other industries. The treatment of industry 5, crude oil and natural gas, provides an example. The crude oil and natural gas industries are combined into one industry by the input-output accounts. Natural gas, however, is predominantly used by the utilities industries (industry 36) while crude oil goes to the petroleum refining industry (industry 17). Thus, we allocate the tax on natural gas to output from the crude oil and natural gas industry (industry 5) used by the utilities (industry 36), while the carbon tax on petroleum is allocated to the use of industry 5 by the petroleum refining industry (industry 17).

TABLE A1: SAP TAX REVENUE CHANGES

Industry	Corporate Income Tax	Personal Income Tax	Total Taxes
Farms	0.095	-0.166	-0.070
Agricultural, forestry, and fishery services	0.023	-0.121	-0.097
Metallic ores mining	0.048	-0.040	0.009
Coal mining	-0.001	-0.053	-0.054
Crude petroleum and natural gas	0.085	-0.400	-0.315
Nonmetallic minerals mining	0.039	-0.095	-0.056
Construction	0.154	-1.319	-1.165
Food and kindred products	0.887	-2.313	-1.427
Tobacco products	0.029	-0.013	0.015
Textile mill products	0.101	-0.194	-0.093
Apparel and other textile products	0.147	-0.229	-0.082
Lumber and wood products	0.137	-0.267	-0.130
Furniture and fixtures	0.023	-0.159	-0.136
Paper and allied products	0.327	-0.699	-0.373
Printing and publishing	0.295	-1.006	-0.710
Chemicals and other products	0.849	-2.638	-1.789
Petroleum refining and related products	0.378	-0.973	-0.596
Rubber and miscellaneous plastics products	0.183	-0.344	-0.162
Footwear, leather, and leather products	0.018	-0.024	-0.007
Stone, clay, and glass products	0.129	-0.310	-0.181
Primary metal industries	0.144	-0.346	-0.202
Fabricated metal products	0.319	-0.948	-0.629
Industrial machinery and other equipment	0.201	-0.611	-0.410
Electronic and other equipment	0.136	-1.261	-1.125
Motor vehicles and equipment	-0.341	-0.320	-0.661
Other transportation equipment	0.204	-0.474	-0.270
Instruments	-0.128	-0.358	-0.486
Miscellaneous manufacturing	0.091	-0.264	-0.173
Railroad and related services; passenger ground transportation	0.143	-0.318	-0.175
Motor freight transportation and warehousing	0.175	-0.362	-0.187
Water transportation	0.038	-0.077	-0.039
Air transportation	0.103	-0.260	-0.157
Pipelines, freight forwarders, and related services	0.077	-0.226	-0.149
Communications, except radio and TV	0.677	-3.167	-2.491
Radio and TV broadcasting	0.677	-0.411	0.266
Utilities	1.675	-3.605	-1.930
Wholesale trade	0.839	-2.920	-2.081
Retail trade	1.270	-3.662	-2.392
Finance	0.000	-8.674	-8.674
Insurance	0.000	-2.868	-2.868
Real estate	0.000	-0.786	-0.786
Hotels and lodging places	0.131	-0.131	0.000
Personal and repair services (except auto)	0.055	-0.231	-0.176
Business services	0.194	-2.340	-2.146
Eating and drinking places	0.131	-0.131	0.000
Automotive repair and services	0.155	-0.130	0.025
Amusements	0.207	-0.460	-0.253
Health services	0.452	-1.052	-0.601
Educational and social services, and membership organizations	0.004	-0.042	-0.039

Source: Authors' calculations. All revenue in billions of dollars.

TABLE A2: PRICE CHANGES FROM CARBON TAX/SAP REFORM

Industry	Carbon Tax	SAP	Total Taxes	BIS
Farms	0.60%	-0.34%	0.26%	56.7%
Agricultural, forestry, and fishery services	0.32%	-0.48%	-0.16%	150.0%
Metallic ores mining	1.08%	-0.18%	0.90%	16.7%
Coal mining	10.35%	-0.48%	9.87%	4.6%
Crude petroleum and natural gas	0.66%	-0.52%	0.14%	78.8%
Nonmetallic minerals mining	1.25%	-0.58%	0.67%	46.4%
Construction	0.46%	-0.42%	0.04%	91.3%
Food and kindred products	0.51%	-0.65%	-0.14%	127.5%
Tobacco products	0.23%	-0.12%	0.11%	52.2%
Textile mill products	0.76%	-0.62%	0.14%	81.6%
Apparel and other textile products	0.47%	-0.44%	0.03%	93.6%
Lumber and wood products	0.45%	-0.41%	0.04%	91.1%
Furniture and fixtures	0.46%	-0.53%	-0.07%	115.2%
Paper and allied products	0.85%	-0.59%	0.26%	69.4%
Printing and publishing	0.32%	-0.68%	-0.36%	212.5%
Chemicals & other products	0.75%	-0.88%	-0.13%	117.3%
Petroleum refining and related products	12.76%	-0.82%	11.94%	6.4%
Rubber and miscellaneous plastics products	0.56%	-0.47%	0.09%	83.9%
Footwear, leather, and leather products	0.53%	-0.43%	0.10%	81.1%
Stone, clay and glass	1.10%	-0.49%	0.61%	44.5%
Primary metal industries	1.62%	-0.41%	1.21%	25.3%
Fabricated metal products	0.70%	-0.60%	0.10%	85.7%
Industrial machinery & other equipment	0.44%	-0.42%	0.02%	95.5%
Electronic and other equipment	0.41%	-0.61%	-0.20%	148.8%
Motor vehicles and equipment	0.50%	-0.57%	-0.07%	114.0%
Other transportation equipment	0.41%	-0.99%	-0.58%	241.5%
Instruments	0.29%	-0.57%	-0.28%	196.6%
Miscellaneous manufacturing	0.36%	-0.49%	-0.13%	136.1%
Railroads and related services; passenger ground transportation	0.79%	-0.46%	0.33%	58.2%
Motor freight transportation and warehousing	0.93%	-0.38%	0.55%	40.9%
Water transportation	0.45%	-0.40%	0.05%	88.9%
Air transportation	1.20%	-0.38%	0.82%	31.7%
Pipelines, freight forwarders, and related services	0.26%	-0.65%	-0.39%	250.0%
Communications, except radio and TV	0.16%	-1.14%	-0.98%	712.5%
Radio and TV broadcasting	0.30%	0.55%	0.85%	-183.3%
Utilities	7.19%	-0.78%	6.41%	10.8%
Wholesale trade	0.24%	-0.44%	-0.20%	183.3%
Retail trade	0.30%	-0.51%	-0.21%	170.0%
Finance	0.14%	-1.98%	-1.84%	1414.3%
Insurance	0.10%	-1.61%	-1.51%	1610.0%
Real estate	0.11%	-0.16%	-0.05%	145.5%
Hotels and lodging places	0.53%	-0.33%	0.20%	62.3%
Personal and repair services (except auto)	0.28%	-0.35%	-0.07%	125.0%
Business services	0.13%	-0.35%	-0.22%	269.2%
Eating and drinking places	0.32%	-0.22%	0.10%	68.8%
Automotive repair and services	0.28%	-0.16%	0.12%	57.1%
Amusements	0.27%	-0.34%	-0.07%	125.9%
Health services	0.25%	-0.27%	-0.02%	108.0%
Educational and social services, and membership organizations	0.26%	-0.24%	0.02%	92.3%
Government & other	0.30%	-0.04%	0.26%	13.3%

Source: Authors' calculations. The Breakeven Incidence Share (BIS) reports the maximum fraction of carbon tax that can be passed back to equity owners before the return to shareholders falls. A measure greater than 100% means that more than 100% backward shifting of the tax would be required for the reform to harm equity owners.

TABLE A3: PRICE CHANGES FROM CARBON TAX/DEP REFORM

Industry	Carbon Tax	DEP	Sum	BIS
Farms	0.42%	-0.27%	0.15%	64.3%
Agricultural, forestry, and fishery services	0.22%	-0.38%	-0.16%	172.7%
Metallic ores mining	0.75%	-0.50%	0.25%	66.7%
Coal mining	7.02%	-0.35%	6.67%	5.0%
Crude petroleum and natural gas	0.45%	-0.33%	0.12%	73.3%
Nonmetallic minerals mining	0.86%	-0.49%	0.37%	57.0%
Construction	0.32%	-0.28%	0.04%	87.5%
Food and kindred products	0.35%	-0.54%	-0.19%	154.3%
Tobacco products	0.16%	0.18%	0.34%	-112.5%
Textile mill products	0.52%	-0.48%	0.04%	92.3%
Apparel and other textile products	0.32%	-0.34%	-0.02%	106.3%
Lumber and wood products	0.31%	-0.31%	0.00%	100.0%
Furniture and fixtures	0.32%	-0.30%	0.02%	93.8%
Paper and allied products	0.58%	-0.45%	0.13%	77.6%
Printing and publishing	0.22%	-0.49%	-0.27%	222.7%
Chemicals & other products	0.52%	-0.70%	-0.18%	134.6%
Petroleum refining and related products	8.89%	-0.45%	8.44%	5.1%
Rubber and miscellaneous plastics products	0.39%	-0.34%	0.05%	87.2%
Footwear, leather, and leather products	0.36%	-0.32%	0.04%	88.9%
Stone, clay and glass	0.75%	-0.32%	0.43%	42.7%
Primary metal industries	1.10%	-0.28%	0.82%	25.5%
Fabricated metal products	0.48%	-0.39%	0.09%	81.3%
Industrial machinery & other equipment	0.30%	-0.15%	0.15%	50.0%
Electronic and other equipment	0.28%	-0.33%	-0.05%	117.9%
Motor vehicles and equipment	0.34%	-0.35%	-0.01%	102.9%
Other transportation equipment	0.28%	-0.44%	-0.16%	157.1%
Instruments	0.20%	-0.29%	-0.09%	145.0%
Miscellaneous manufacturing	0.25%	-0.32%	-0.07%	128.0%
Railroads and related services; passenger ground transportation	0.55%	-0.33%	0.22%	60.0%
Motor freight transportation and warehousing	0.65%	-0.26%	0.39%	40.0%
Water transportation	0.31%	-0.31%	0.00%	100.0%
Air transportation	0.84%	-0.19%	0.65%	22.6%
Pipelines, freight forwarders, and related services	0.18%	-0.55%	-0.37%	305.6%
Communications, except radio and TV	0.11%	-0.89%	-0.78%	809.1%
Radio and TV broadcasting	0.21%	-0.21%	0.00%	100.0%
Utilities	4.93%	-0.60%	4.33%	12.2%
Wholesale trade	0.16%	-0.30%	-0.14%	187.5%
Retail trade	0.21%	-0.33%	-0.12%	157.1%
Finance	0.09%	-1.05%	-0.96%	1166.7%
Insurance	0.07%	-1.00%	-0.93%	1428.6%
Real estate	0.08%	-0.13%	-0.05%	162.5%
Hotels and lodging places	0.37%	-0.24%	0.13%	64.9%
Personal and repair services (except auto)	0.19%	-0.25%	-0.06%	131.6%
Business services	0.09%	-0.26%	-0.17%	288.9%
Eating and drinking places	0.22%	-0.18%	0.04%	81.8%
Automotive repair and services	0.19%	-0.14%	0.05%	73.7%
Amusements	0.19%	-0.35%	-0.16%	184.2%
Health services	0.17%	-0.19%	-0.02%	111.8%
Educational and social services, and membership organizations	0.18%	-0.17%	0.01%	94.4%
Government & other	0.20%	-0.03%	0.17%	15.0%

Source: Authors' calculations. The Breakeven Incidence Share (BIS) reports the maximum fraction of carbon tax that can be passed back to equity owners before the return to shareholders falls. A measure greater than 100% means that more than 100% backward shifting of the tax would be required for the reform to harm equity owners.

REFERENCES

- Armington, Paul. 1969. "A Theory of Demand for Products Distinguished by Place of Production." *International Monetary Fund Staff Papers* 16:159-76.
- Ballard, Charles L.; Fullerton, Don; Shoven, John B. and Whalley, John. 1985. *A General Equilibrium Model for Tax Policy Analysis*. Chicago: University of Chicago Press.
- Bovenberg, A. Lans and Goulder, Laurence. 2000. "Neutralizing the Adverse Industry Impacts of CO2 Abatement Policies: What Does It Cost?" in *Distributional and Behavioral Effects of Environmental Policy* eds. C. Carraro and G. E. Metcalf. Chicago: University of Chicago Press.
- Bovenberg, A. Lans and Goulder, Lawrence H. 1996. "Optimal Environmental Taxation in the Presence of Other Taxes: General Equilibrium Analyses." *American Economic Review* 86:985-1000.
- Energy Information Administration. U.S. Department of Energy. 1999. "Emissions of Greenhouse Gases in the United States 1998." Washington, DC.
- Feenberg, Daniel. "U.S. Federal Average Marginal Income Tax Rates," National Bureau of Economic Research, 2000.
- Feldstein, Martin, Dicks-Mireaux, Louis and Poterba, James. 1983. "The Effective Tax Rate and the Pretax Rate of Return." *Journal of Public Economics* 21:129-58.
- Fullerton, Don. 1996. "Why Have Separate Environmental Taxes?," in J. M. Poterba, ed. *Tax Policy and the Economy*, ed. J.M. Poterba. 10:33-70 Cambridge: MIT Press for the National Bureau of Economic Research.
- Fullerton, Don; King, A. Thomas; Shoven, John B. and Whalley, John. 1981. "Corporate Tax Integration in the United States: A General Equilibrium Approach." *American Economic Review*, 71(5):677-91.
- Gale, William G. and Hassett, Kevin A. 2000. "The Effects of Environmental Tax Shifting on U.S. Capital Formation," San Francisco: Redefining Progress.
- Gordon, Roger H. and Mackie-Mason, Jeffrey K. 1990. "Effects of the Tax Reform Act of 1986 on Corporate Financial Policy and Organizational Form," in *Do Taxes Matter?* ed. J. Slemrod. 91-131 Cambridge: MIT Press.
- Graham, John R. 1999 "Do Personal Taxes Affect Corporate Financing Decisions?" *Journal of Public Economics*, 73(2):147-85.
- Hamond, M. Jeff; DeCanio, Stephen J.; Duxbury, Peggy; Sanstad, Alan H. and Stinson, Christopher H. 1997. *Tax Waste, Not Work*. San Francisco: Redefining Progress.
- Harberger, Arnold C. 1962. "The Incidence of the Corporation Income Tax." *Journal of Political Economy*, 70(3):215-40.
- Herman, Shelby W. 2000. "Fixed Assets and Consumer Durable Goods." *Survey of Current Business*, 80(April):17-30.
- Hubbard, R. Glenn. 1993. "Corporate Tax Integration: A View from the Treasury Department." *Journal of Economic Perspectives*, 7:115-32.
- Leontief, Wassily. 1986. *Input-Output Economics*. New York: Oxford University Press.
- McLure, Charles E., Jr. 1979. *Must Corporate Income Be Taxed Twice?* Washington, DC: The Brookings Institution.
- Metcalf, Gilbert E. 1999. "A Distributional Analysis of Green Tax Reforms." *National Tax Journal*, 52(4):655-81.
- Park, Thae S. 2000. "Comparison of BEA Estimates of Personal Income and IRS Estimates of Adjusted Gross Income." *Survey of Current Business*, 80(February):12-22.

Pechman, J. 1985. *Who Paid the Taxes: 1966-85?* Washington DC: The Brookings Institution.

U.S. Department of the Treasury. 1992. *Integration of the Individual and Corporate Tax Systems: Taxing Business Income Once.* Washington, DC: U.S. Government Printing Office.

Weyant, John P. and Hill, Jennifer N. 1999. "The Costs of the Kyoto Protocol: A Multi-Model Evaluation. Introduction and Overview." *The Energy Journal*, 1999 pp. vii-xliv.

Wolff, Gary H. 2000. "When Will Business Want Environmental Taxes?" San Francisco: Redefining Progress.

REDEFINING PROGRESS

**1904 Franklin Street
6th Floor
Oakland, CA 94612**

Telephone: (510) 444-3041

FAX: (510) 444-3191

E-mail: info@rprogress.org

Web site: www.RedefiningProgress.org

Redefining Progress is a nonprofit, nonpartisan organization that develops policies and tools to reorient the economy so it values people and nature first.